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The forest industry in the economy of Manitoba, 1979-80

W.J. Ondro and T.B. Williamson

Information Report NOR-X-263
Northern Forest Research Centre

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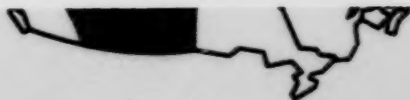
0016091K VOL 188 263 1984

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SD 391 0365

INFORMATION REPORT (NORTHERN FOREST
RESEARCH CENTRE (CANADA))
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Front cover, clockwise from upper left: white spruce plantation, short-wood log pile, Abitibi-Price mill at Pine Falls, and rolled newsprint.

THE FOREST INDUSTRY IN THE ECONOMY OF MANITOBA, 1979-80

W.J. ONDRO AND T.B. WILLIAMSON

INFORMATION REPORT NOR-X-263

**NORTHERN FOREST RESEARCH CENTRE
CANADIAN FORESTRY SERVICE
ENVIRONMENT CANADA
1984**

•Minister of Supply and Services Canada 1984
Catalogue No. FO46-12/263E
ISBN-0-662-13393-5
ISSN-0704-7673

This publication is available at no charge from:

Northern Forest Research Centre
Canadian Forestry Service
Environment Canada
5320 - 122 Street
Edmonton, Alberta, Canada
T6H 3S5

Ondro, W.J. and T.B. Williamson. 1984. The forest industry in the economy of Manitoba, 1979-80. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-263.

ABSTRACT

The forest industry in Manitoba was surveyed in 1980. The results are analyzed in this report in terms of forest resources, capital, employment impact, capacity and production, markets, annual revenues and expenditures, and socio-economic impact. Numerous tables and figures provide detailed information.

RÉSUMÉ

Les résultats d'une étude sur l'industrie forestière du Manitoba réalisée en 1980 sont analysés dans ce rapport sur le plan des ressources forestières, des capitaux, des emplois, des possibilités et de la production, des marchés, des recettes et des dépenses annuelles et des effets socioéconomiques. On y trouve un grand nombre de tableaux et de données qui fournissent des renseignements détaillés.

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CHAPTER 1

INTRODUCTION

The forest is one of Manitoba's most important natural resources, but, like most natural resources, it is limited in size and exploitability. These limitations raise important policy questions. How should the resource be developed and at what rate? Who should pay the costs of resource development and management? Who are the principal benefactors of resource use? At what rate should the industry be allowed to expand? These general questions and a wide range of other more specific issues must ultimately be addressed within the political process. If these issues are to be addressed effectively, however, adequate information must be made available to policy makers, resource managers, and resource users.

This report provides detailed statistics on commercial utilization of the forest resource in Manitoba. The data were collected for the base year 1979 - 80 as part of a Canadian Forestry Service study which had the broad objectives of describing the size and structure of the Manitoba forest industry and quantifying its impact on the provincial economy. The specific objectives of this study were:

1. to describe the forest land base and growing stock;
2. to outline forest production facilities and their capacity by region;
3. to summarize and evaluate employment levels in manufacturing

and woodlands operations;

4. to survey and assess the fixed capital stock;
5. to quantify the major forest products and identify their market destinations;
6. to establish the major economic benefits that forest resource development provides to individual regions and to the province; and
7. to examine the potential for and impact of future industry expansion.

Economic Assessment Variables

The information in this report is summarized by industry group and by the administrative regions designated as forest sections by the Forestry Branch of the provincial Department of Natural Resources (Figure 1). Information provided is based on the inputs used by the forest industry: forest resources, capital, and labor. Each of these factors of production is discussed in detail in separate chapters.

An evaluation of the type and quantity of forest industry products is an essential element of a descriptive study of this type. The output of Manitoba's forest industry is therefore presented by product type, region of origin, and market destination. Factors limiting industrial

¹ Manitoba's forest resources are managed by the Forestry Branch of the Department of Natural Resources.

² Economic assessment variables are currently collected by Statistics Canada for medium- to large-sized industry complexes. These data neither represent the total economic impact of the industry, nor contain sufficient detail for policy makers and management agencies.

expansion were also identified and analyzed in the context of under-utilized industrial capacity.

Variables that can be used to assess the economic impact of the forest industry on the Manitoba economy include value of sales, number of employees, wages and salaries, value added, value of exports, employment multipliers, and community dependence. As most statistical reports present these types of information in aggregate form, the evaluation of the impact of a single industry group or of the entire forest industry in one specific region is often difficult. Also, presentation of any variable by itself may not fully reflect all the economic and social factors important to policy formation and management decisions. The goal of this report is to present the full range of impact variables in greater detail than is provided by other sources.

In addition to providing a thorough quantitative assessment of primary inputs, outputs, and economic impacts, the report considers a number of other specific aspects of the industry, including technological and structural features. These features are discussed in terms of concentration of production, types of processing equipment, nature and extent of industrial integration, ownership type, length of ownership, and age of machinery.

Classification Of The Forest Industry

In general terms the forest industry includes all industries classified under Major Groups 4, 5, 25, and 27 of Divisions C (Logging and Forestry) and E (Manufacturing) of the Standard Industrial Classification Manual (Statistics Canada 1980). Industries within these major groups are listed in Appendix 1.

For the purposes of this report, however, the term forest industry is more restricted and is limited to primary wood-using industries. It includes only those firms using roundwood or chips in their manufacturing processes. Data for the logging industry (Major Group 4, Division C) were included where applicable. Forest industry groups that were included in the survey are listed in Table 1. In order to satisfy confidentiality requirements, data for asphalt roofing manufacturers and fiberboard plants are presented in combination with data from the two pulp and paper mills. Also, data from the wood preservation plants are combined with those from the miscellaneous industry group where sensitive information is discussed.

Data Collection Procedures And Survey Techniques

This study was designed to collect information supplementary to that provided by the Forest Statistics section of the Manufacturing and Primary Industry Division of Statistics Canada. A detailed questionnaire was used for larger firms and the information was collected in personal interviews conducted by representatives of the Northern Forest Research Centre (NoFRC). For small firms, an abbreviated form was used and information for this shorter questionnaire was collected through personal interviews or by telephone.

An initial list of forest industry firms was compiled from the Directory of primary wood-using industries in Alberta, Saskatchewan and Manitoba, 1972 (Teskey and Smyth 1973), internal records of the Manitoba Forestry Branch, and the Central Forest Products Association. A complete census of all forest industry groups was performed. The distribution of forest industry firms is presented in

³ Copies of the questionnaires are available on request.

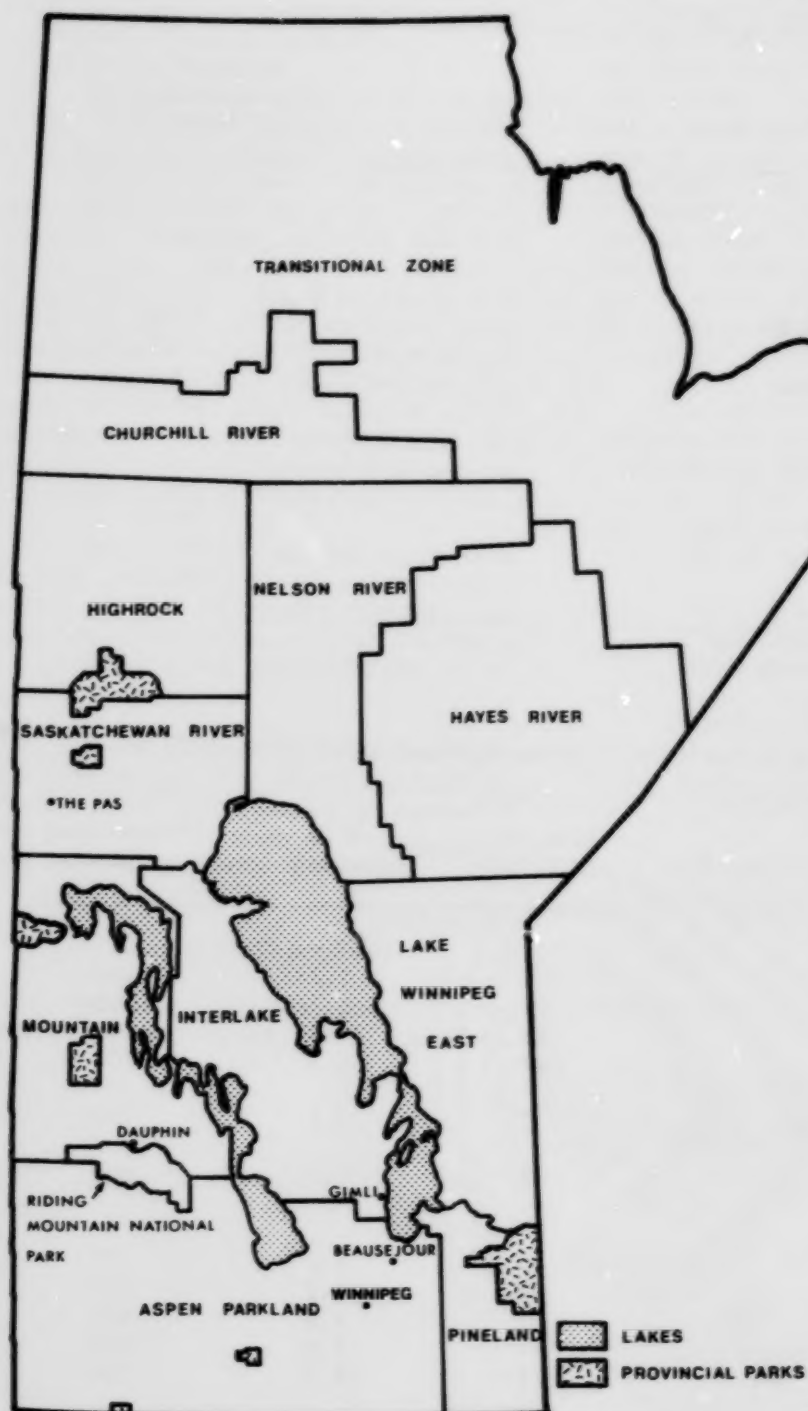


Figure 1. Forest Sections: Manitoba Department of Natural Resources.

Table 1. Standard industrial classification code (SIC) of industry groups included in the NoFRC forest industry survey, 1980^a

Industry group	Standard Industrial Classification Code (SIC)
Forestry	
Logging	0411
Wood industries	
Sawmills and planing mills	2512
Other millwork	2549
Wooden boxes and pallets	2561
Wood preservation	2591
Paper and allied industries	
Pulp	2711
Newsprint	2712
Building board	2714
Asphalt roofing	2721

^a Source: Statistics Canada 1980.

Table 2. Sample size of forest industry groups surveyed in Manitoba, 1979-80

Industry group	Total no. of firms	% of firms	% interview completion
Sawmills			
5 MM fbm and over	5	1.7	100
1 MM to 5 MM fbm	19	6.7	100
100 M to 1 MM fbm	43	15.1	100
Less than 100 M fbm	109	38.4	100
Independent planing mills	5	1.8	100
Wood preservation	2	0.7	100
Miscellaneous			
Building logs	5	1.7	100
Pallets	9	3.2	100
Posts and poles	5	1.8	100
Pulp, paper, and fiberboard	4	1.4	100
Independent log producers	78	27.5	100
Total	284	100.0	

Table 2 and locations of firms surveyed (excluding sawmills producing less than 1 MM foot board measure (fbm) annually) are shown in Figures 2 and 3.

During the months of March and April, 1980, the survey questionnaire used for a previous study in Alberta (conducted in 1979) was redesigned. The purpose of this modification was to facilitate computer processing of the Manitoba survey data. Field interviews began in May, 1980. Where possible, data were collected for the 1979-80 fiscal year; otherwise data for the 1979 calendar year were obtained. All questionnaires were subjected to an office audit to ensure completion, internal consistency, and accuracy. The field interview phase was completed in September, 1980.

All personnel received instructions on the interpretation of questionnaires, techniques of conducting personal and telephone interviews, and the rationale for completing the questionnaires on the specified forms.

The Central Forest Products Association and the Manitoba Forestry Branch were most helpful in conveying the purpose of the study to forestry firms and in locating remote operations.

Analytical Procedures

In those individual questionnaires where inconsistencies were identified,

follow-up calls were made to verify the firm's responses. After final auditing of individual questionnaires, relevant variables were totaled by industry group, by region, or by a combination of industry and region. Estimates based on mean values were used to account for missing entries in individual questionnaires. In situations where responses were universally inadequate, secondary data sources such as Statistics Canada were used to supplement survey data. Totals and averages for industry groups were again examined for consistency to ensure accuracy.

Sawmills were divided into the following four groups, according to their production in 1979:

- (i) large sawmills, output equal to or exceeding 5 MM fbm;
- (ii) medium, output between 1 MM and 5 MM fbm;
- (iii) small, output between 100 M and 1 MM fbm; and
- (iv) output less than 100 M fbm, also classified as small.

All information pertaining to the forest resource and forest industry in this report is presented in Imperial units as the industry has yet to convert to metric standards. Metric conversion values are provided in Appendix 2.

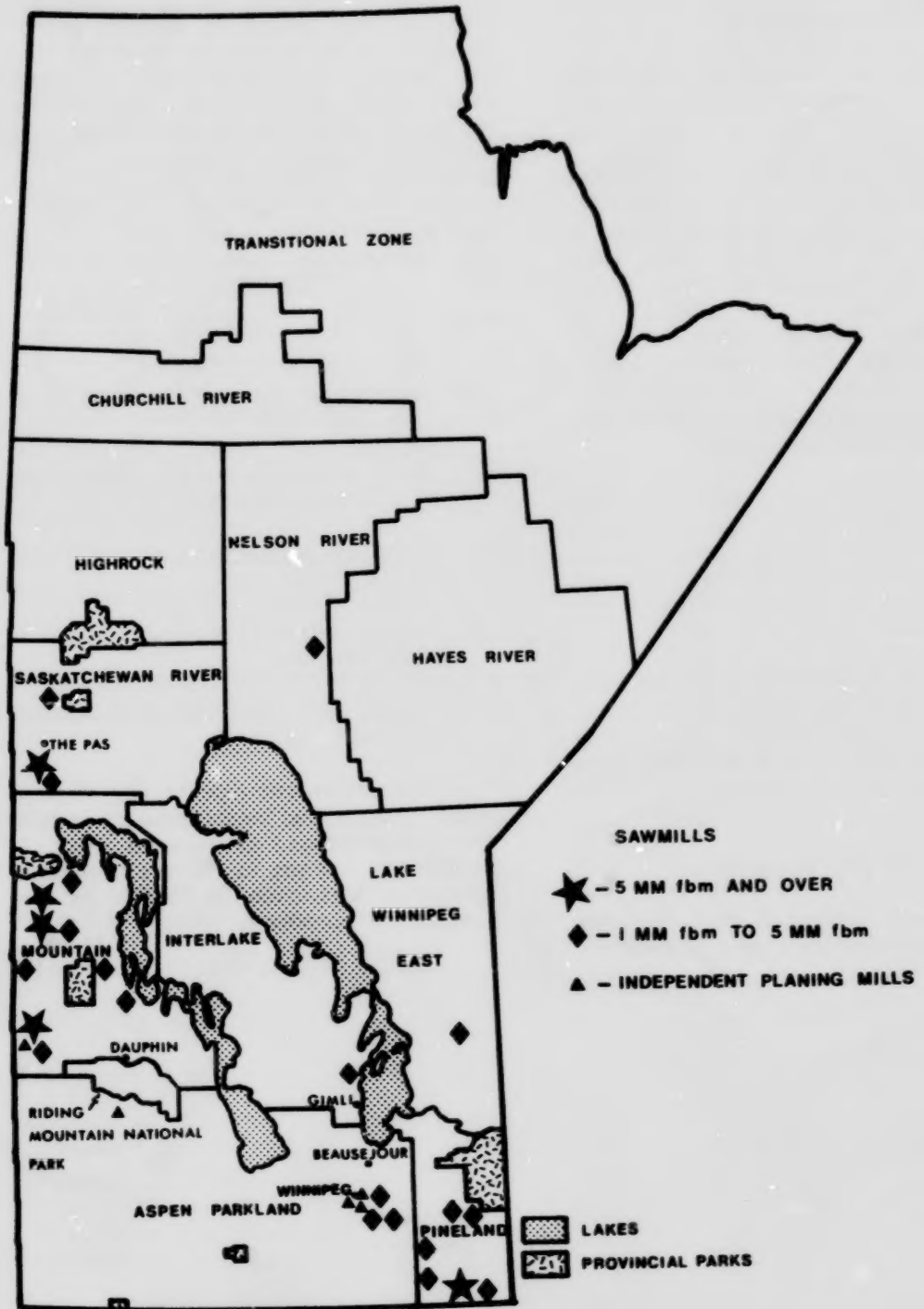


Figure 2. Distribution of the sawmill and planing mill industry.

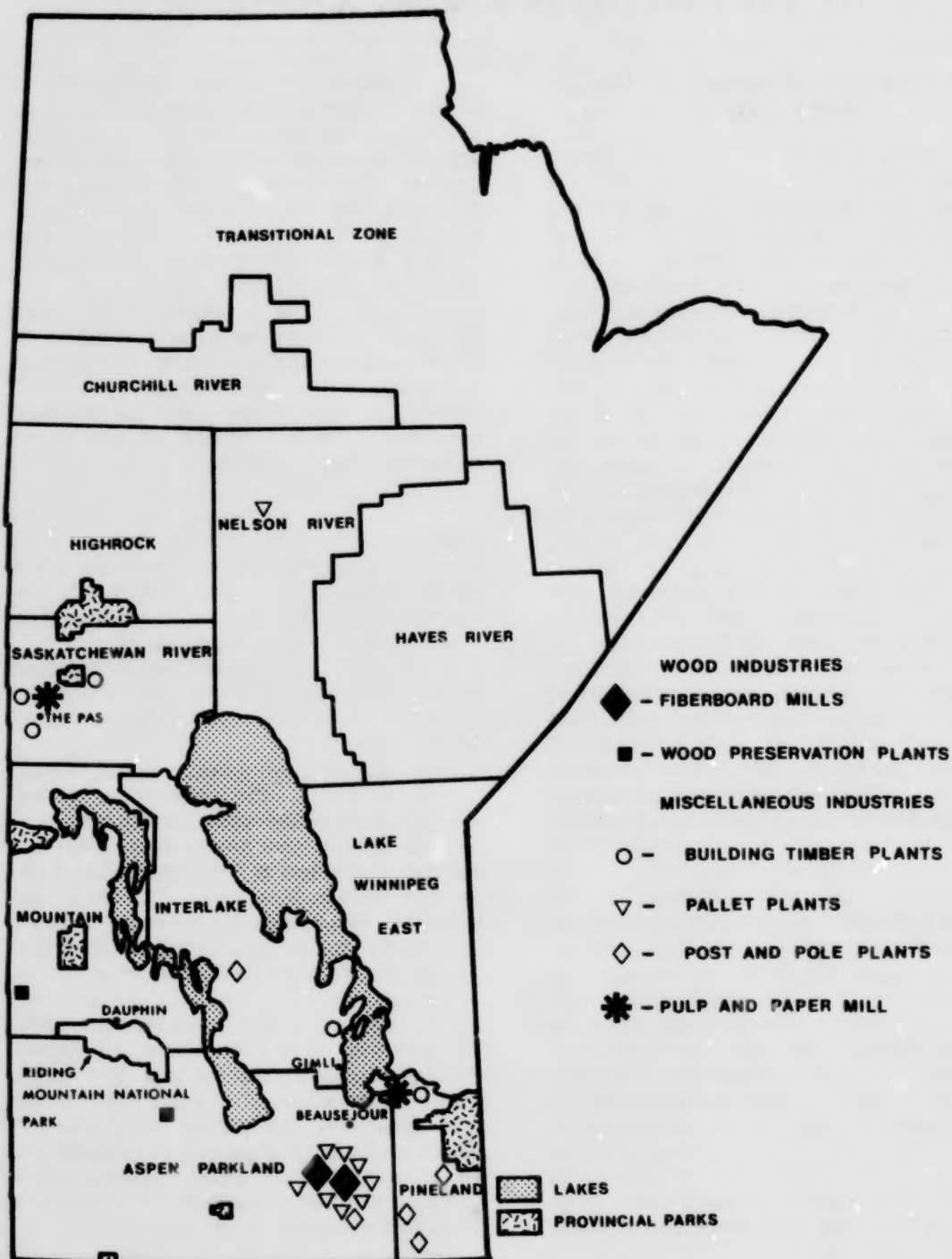


Figure 3. Distribution of other primary wood-using industries.

CHAPTER II

THE FOREST INDUSTRY OF MANITOBA: A PERSPECTIVE

Historical Development Of The Forest Industry

Prior to 1870 the area now known as Manitoba was controlled by the Hudson's Bay Company. During this era commercial resource extraction was limited to trapping and hunting. In 1870, the area became part of Canada and the Province of Manitoba was inaugurated. Initially, the province encompassed only a small area in the southern agricultural belt. The remaining area was placed under direct federal control as part of the Northwest Territories. Even within the boundaries of the province, however, the federal government maintained control over public lands and natural resources, including forests.

The area of the province was gradually expanded, and its current boundaries were established in 1912. In 1930, jurisdiction over natural resources, including the forests, was transferred to the province, and the provincial legislature enacted the Forest Act, which provided authority for forest administration. Provincial administration was initially the responsibility of the Manitoba Forest Service of the Department of Mines and Natural Resources. The resource is now administered by the Forestry Branch of the Department of Natural Resources.

Commercial utilization of Manitoba's forest lands first occurred around 1870 in the province's southern forests. This activity resulted principally from the lumber demand generated by the province's early homesteaders. The construction of the Canadian Pacific Railway in the 1880s created additional demand for forest products as large numbers of railway ties were required for rail line construction.

During the period from 1880 to 1915 the forest industry was dominated by large sawmill operations utilizing white spruce harvested from licensed timber berths. The major mills were located in Winnipeg and Whitemouth. Total annual lumber production from these mills was 34 MM fbm at the turn of the century (Manitoba Department of Industry and Commerce 1970). These mills were gradually replaced by a large number of smaller stationary and portable sawmills operating with timber made available mostly through timber sales or settlers' permits. The last of the original large mills was closed in 1916.

In 1910, lumbering was extended into the province's northern forests when The Pas Lumber Company constructed a large sawmill on the banks of the Saskatchewan River at The Pas. The majority of the wood supplied for this mill was harvested in Saskatchewan and rafted down the Carrot and Saskatchewan Rivers. The mill continued operating until 1958.

In 1927, the Manitoba forest industry diversified with the construction of the prairie provinces' first pulp and paper manufacturing facility at Pine Falls in southeastern Manitoba. This mill, now operated by Abitibi-Price Inc., remains one of the major processing facilities in the province's forest industry.

Another major industrial complex is operated by Manitoba Forestry Resources Ltd. (Manfor), a provincial crown corporation. This plant, located at The Pas, was completed in 1971 and consists of a kraft pulp and paper mill and an integrated sawmilling facility. The complex utilized about 45% of Manitoba's total softwood harvest in 1980-81.

The level and pattern of the harvest from provincial crown lands between 1930 and the present are shown in Table 3. These data, which have been obtained from various annual reports of the Manitoba Department of Mines and Natural Resources and the Department of Natural Resources, show the annual harvest has generally increased over this 50-year period, though periodic fluctuations in the trend have occurred. The annual cut peaked in 1981 at 81 930 000 cu. ft., but dropped in 1982 to 62 930 000 cu. ft. Although the proportion of the total cut represented by sawlogs has remained the same over the period, the proportions of the total cut of the pulpwood and 'other' categories have exhibited inverse trends.

The Forest Industry

The forest industry of Manitoba is composed of a number of industry groups, each producing a distinct product. These industry groups are the sawmill and planing mill, wood preservation, miscellaneous, and pulp, paper, and fiberboard industries.

Sawmill and planing mill industry groups

Manitoba's sawmill and planing mill industry group was comprised of 181 mills that produced over 151 MM fbm of lumber in 1979-80. This production was, however, not distributed evenly among all sawmills and planing mills. There was also a great diversity in certain technological features among the firms. For this reason single averages of the industry group are not representative. To cope with this diversity, sawmills were categorized into four separate size classes for this study (Table 2). Independent planing⁴ mills have been considered separately⁴.

The Manitoba sawmill industry

group was quite concentrated, with 3% (five mills) of the mills accounting for 63% of total production (Table 4). Although the large mills accounted for the majority of the production, small sawmills played an important role in local economies, for several reasons. First, the revenues generated by small mills were an important source of primary and supplementary income of both full-time and part-time independent operators. Second, the small mills were an important source of low-cost lumber in local economies. Third, the mills utilized isolated tracts of timber that may have been uneconomical for larger operators, thus facilitating a more complete utilization of the resource.

An important feature of the sawmill industry group is the number of mills with planing facilities. All of Manitoba's large sawmills maintained planing facilities in 1979-80 (Table 5). A lower proportion of small sawmills had planers. This variance between large and small sawmills is probably the result of the type of market each mill class services. The majority of the production in the small mill classes is consumed in local markets while production from the larger mills is generally intended for the larger urban, out-of-province, and foreign markets. Information on markets for Manitoba's lumber production is provided in greater detail in Chapter VII.

Ownership in the two largest categories was primarily vested in limited liability corporations (Table 6). The large government-owned mill (Manfor), accounted for 64% of the total production of large sawmills. Most small sawmills were held as single proprietorships. Of the five independent planing mills, the three largest were limited liability corporations and the remaining two were single proprietorships.

The tenure of ownership in the sawmill industry group was also variable

⁴ Independent planing mills either purchase rough lumber from other sawmills or custom-plane lumber.

Table 3. Distribution of the harvest from provincial crown lands from 1930 to 1982

Year ^a	Sawlog harvest (⁰⁰⁰ cu. ft.)	%	Pulpwood harvest (⁰⁰⁰ cu. ft.)	%	Other ^b harvest (⁰⁰⁰ cu. ft.)	%	Total harvest (⁰⁰⁰ cu. ft.)
1930	4 873	28	1 801	10	11 053	62	17 727
1935	4 344	15	4 803	17	19 705	68	28 852
1940	9 076	32	7 628	27	11 689	41	28 393
1945	8 334	30	10 842	39	8 581	31	27 757
1950	11 795	33	15 009	42	8 687	25	35 491
1955	11 407	34	18 469	55	3 567	11	33 443
1960	8 970	30	18 187	60	3 108	10	30 265
1965	6 639	24	18 929	67	2 472	9	28 040
1970	11 513	26	29 558	68	2 684	6	43 755
1975	17 022	25	47 569	70	3 637	5	68 228
1979	21 153	35	34 149	56	5 227	9	60 529
1980	22 848	33	39 729	58	5 933	9	68 510
1981	24 084	29	51 489	63	6 357	8	81 930
1982	18 893	30	38 881	62	5 156	8	62 930

^a Fiscal year, e.g., 1982 = April 1, 1981 - March 31, 1982.

^b Includes railway ties, mining timbers, fence posts, telephone and power poles, and fuelwood.

Table 4. Concentration of production in the sawmill industry group, 1979-80

Cumulative number of mills	Cumulative % of mills	Cumulative % of total production
5	3	63
24	14	87
67	38	98
176	100	100

Table 5. Number of sawmills with associated planing facilities by size class, 1979-80

Annual output	No. of sawmills with planing mills	No. of sawmills without planing mills	Total no. of sawmills
5 MM fbm and over	5	0	5
1 MM to 5 MM fbm	7	12	19
100 M to 1 MM fbm	12	31	43
Less than 100 M fbm	20	89	109

Table 6. Type of ownership in the sawmill and independent planing mill industry groups, 1979-80

Industry group	Single proprietorship	Partnership	Limited liability	Government or service groups
Sawmills				
5 MM fbm and over	0	0	4	1
1 MM to 5 MM fbm	5	2	12	0
100 M to 1 MM fbm	30	6	7	0
Less than 100 M fbm	94	11	4	0
Independent planing mills	2	0	3	0

Table 7. Average length of ownership and age of equipment in sawmills and planing mills, 1979-80

Industry group	Average length of ownership (years)	Average age of equipment (years)
Sawmills		
5 MM fbm and over	8.0	11.3
1 MM to 5 MM fbm	15.5	13.8
100 M to 1 MM fbm	12.2	15.4
Less than 100 M fbm	13.9	27.8
Independent planing mills	6.5	37.5

from one category to the next. In 1980, the average length of ownership among large sawmills was 8 years (Table 7). The average length of ownership among medium mills was 15 years. Ownership tenure decreased to approximately 13 years for small sawmills. Independent planing mills had remained under the same ownership for an average of 6 years.

The age of capital employed in processing in many ways reflects an industry's degree of innovativeness and its ability to respond to competitive forces. This is clearly illustrated in Manitoba's sawmill industry group. In large sawmills, the average age of equipment was about 11 years in 1979-80 (Table 7). A large portion of the production from this category of mills is sold in U.S. markets, where the forces of competition are strong. The relatively low average age of equipment reflects the need for maintaining a modern capital stock. The average age of equipment in the three smaller classes increased from 14 years for medium mills to 28 years for small mills producing less than 100 M fbm annually. Production from these categories is marketed primarily in local and provincial markets. For independent planing mills the average age of equipment was 37 years.

Portability of processing equipment is a common feature in medium and small sawmills (Table 8). All of the large mills are stationary while 70% of small mills producing 100 M to 1 MM fbm annually are portable.

The distribution of lumber processing equipment in large sawmills in 1973 and 1979 is shown in Table 9. The only significant shifts in the proportions of mills with particular types of equipment during the 6-year period was in the numbers of debarkers, chippers, and dry kilns. The numbers of these three facilities increased between 1973 and 1979. This trend reflects a universal trend in North American sawmills toward improved recovery and better utilization

of the forest resource. The state-of-the-art equipment in processing technologies that optimize recovery and improve utilization is the recently developed Chip-N-Saw. In 1979, the one mill with Chip-N-Saw facilities was the large Manfor mill.

Wood preservation and miscellaneous industry groups

There are two wood preservation plants in the Manitoba forest industry. One of these plants is integrated with a sawmill and the other produces treated products only. Both plants use chromated copper arsenate in a pressure-treatment system.

The 19 plants in the miscellaneous wood-using industry group produce a variety of products, including building timbers (five plants), pallets (nine plants), and untreated posts and poles (five plants). Nine of these plants, employing a total of 142 persons, are located in Winnipeg. Ten of the plants are operated by limited liability corporations and the remaining nine are single proprietorships or partnerships (Table 10). In 1980, the average age of equipment in the industry group was 11 years and the average length of ownership was 13 years (Table 11).

Pulp, paper, and fiberboard industry group

This sector is comprised of four industrial facilities, including one pulp and newsprint mill, one unbleached kraft pulp and paper mill, one construction grade paper mill, and one fiberboard plant. Together these mills account for 52% of the employment in the Manitoba forest industry.

The province's largest single plant (by output) is the Abitibi-Price Inc. pulp and newsprint mill at Pine Falls. This mill began operation in 1928 and is the oldest forest products company in the

Table 8. Number of portable and stationary sawmills and planing mills, 1979-80

Industry group	Number of stationary mills	%	Number of portable mills	%
Sawmills				
5 MM fbm and over	5	100	0	0
1 MM to 5 MM fbm	11	58	8	42
100 M to 1 MM fbm	13	30	30	70
Less than 100 M fbm	58	53	51	47
Independent planing mills	3	60	2	40

Table 9. Distribution of lumber processing equipment in large sawmills in 1973^a and in 1979-80

Facility	1973 Mill No. ^b				1979 Mill No.				
	1	2	3	4	1	2	3	4	5
Debarker	3	0	1	1	3	1	1	2	1
Cut-off saw	0	0	2	0	0	0	0	0	0
Circular head saw	0	2	0	0	0	0	1	0	1
Scrag, band, quad or gang saws	1	0	2	2	1	1	2	1	1
Chip-N-Saw, chipping canters	1	0	0	0	2	0	0	0	0
Reman or resaw	0	0	2	0	0	1	0	2	1
Edgers and trimmers	3	4	2	2	3	3	2	2	2
Chippers	0	0	0	1	2	1	0	1	1
Chipping edgers	2	0	0	0	2	0	0	0	0
Planer	1	1	0	2	0	1	1	1	1
Dry kiln	4	0	0	0	6	1	1	0	0

^a Source: Teskey and Smyth 1974.^b Mill Nos. 1, 2, 3, and 4 in 1973 do not necessarily correspond to Mill Nos. 1, 2, 3, 4, and 5 in 1979.

Table 10. Ownership in Manitoba's forest industry groups (excluding sawmills and planing mills), 1979-80

Industry group	Single proprietorship	Partnership	Limited liability companies	Government-owned
Wood preservation	0	0	2	0
Miscellaneous	8	1	10	0
Pulp, paper, and fiberboard	0	0	3	1

Table 11. Length of ownership and average age of equipment in the forest industry groups (excluding sawmills and planing mills), 1979-80

Industry group	Average years of current ownership	Average age of equipment (years)
Wood preservation ^a	7.0	22.5
Miscellaneous	12.6	11.0
Pulp, paper and fiberboard	23.0	26.0

^a Averages include the preservation plant, which is integrated with the sawmill.

prairie provinces. The mill produces pulp using both sulphite and mechanical breakdown processes. All of the timber for the sulphite process line and at least 70% of the roundwood for the stone grinder process line is spruce. The remaining input is primarily jack pine. Nearly a quarter of the total employment in Manitoba's primary wood-using industries is accounted for by this mill. The majority of the newsprint produced by Abitibi-Price Inc. is exported to the United States.

The second largest mill (by output) is the Manfor kraft pulp mill at The Pas. This mill accounts for another quarter of the province's forest industry employment.⁵ The mill produces an unbleached kraft paper, most of which is used in Canada for the manufacture of brown paper bags.

The two remaining mills in this group, both located in Winnipeg, are operated by Building Products of Canada Ltd. and Welclad Industries of Canada Ltd.. Building Products, which commenced operations in 1939, produces pulp that is further manufactured into asphalt roofing materials and construction-grade papers. Welclad, which opened in 1952, produces fiberboard panel products.

Information on ownership type, ownership tenure, and average age of equipment for this industry group is provided in Tables 10 and 11.

Forest Industry Integration

Integration in the Manitoba forest industry takes three forms: vertical, horizontal, and conglomerate. Vertically integrated firms are operations that "perform successive phases of the same overall production process" (Thompson

1973). For example, in the sawmill industry group, a vertically integrated firm is one that logs, rough-saws, planes, and markets the final product. In the pulp, paper, and fiberboard industry group, a fully integrated firm would log, manufacture pulp, convert the pulp into a final consumer product, and market the product.

Horizontally integrated firms are multiplant enterprises that own and manage a number of geographically distinct plants, each producing a similar product. In the sawmill industry group, a horizontally integrated firm would own and manage a number of independently operated sawmills.

Conglomerates are multiplant enterprises where each plant produces a different product. For example, a particular firm may produce a variety of products (e.g., pulp and lumber) where a separate production process and plant are required for each product.

Vertical integration in the Manitoba forest industry is shown in Table 12. In all groups but the miscellaneous category, a minority of operations carry out single phases of the overall manufacturing process and most are vertically integrated to some degree. Horizontally integrated and conglomerated firms are shown in Tables 13 and 14. Two lumber-producing firms are horizontally integrated and four companies are conglomerates.

Future Development

The potential long-term expansion and development of the Manitoba forest industry will depend on a number of factors, especially the availability of an economically operable wood supply. Four

⁵ The employment opportunities generated by Manfor's pulp mill taken together with those of Manfor's sawmill operations constitute 34% of all primary wood-using employment.

Table 12. Vertical intergration^a of forest industry groups, 1979-80

	Logging, sawing, & planing	Logging & sawing	Sawing & planing	Sawing only	Total
Sawmills	No. of mills				
5 MM fbm and over	5	0	0	0	5
1 MM to 5 MM fbm	7	9	1	2	19
100 M to 1 MM fbm	10	20	5	8	43
Less than 100 M fbm	11	70	7	21	109
Total	33	99	13	31	176
Wood preservation	Logging, sawing, & preserving	Logging & preserving	Sawing & preserving	Preserving only	Total
Total	1	1	0	0	2
Miscellaneous	Logging & processing	Processing only	Total		
Pallet plants	0	9	9		
Building timber	5	0	5		
Posts and pole producer	5	0	5		
Total	10	9	19		
Pulp, paper, and fiberboard mills	Logging & processing		Processing only	Total	
Total	3		1	4	

^a Many of the firms considered as vertically integrated (with respect to logging) utilized contractors for either parts or all of their logging operations.

Table 13. Major horizontally integrated firms, 1979-80

Southeast Forest Products Ltd.

Sawmill at Swan River
Two sawmills at Blumenort

Spruce Products Ltd.

Sawmill at Swan River
Sawmill at Atikameg Lake

Table 14. Conglomerates by ownership and industry group, 1979-80

Manitoba Forestry Resources Ltd.

Sawmill at The Pas
Pulp and paper mill at The Pas

Prendiville Industries Ltd.

Sawmill at Wanless
Post-peeling plant at Birch River
Wood-preservation plant at Neepawa
Pallet plant at Thompson (Northwest Manufacturing)

Roblin Forest Industries Ltd.

Sawmill at Roblin
Wood-treating plant at Roblin
Post-peeling operation at Roblin

Southeast Forest Products Ltd.

Sawmill at Swan Rivers and two sawmills at Blumenort
Independent planing mill at Blumenort

An additional 44 firms sell logs to other primary
manufacturers and produce their own primary products.

principal means can be used to augment wood supply to ensure that future industrial demands for roundwood can be satisfied. These include access development into currently inoperable areas, improved utilization, improved protection, and the enhancement of the productivity of forest land through intensive forest management.

The province of Manitoba has large surpluses⁶ of unutilized resources available, but a major portion of this excess volume is located in areas that lack developed transportation networks. The amount of surplus, along with the associated levels of lumber and pulp that could be produced from this surplus, is shown in Table 15. The final product equivalent of these wood surpluses is an extra 263 MM fbm of softwood lumber per year, 1540 air-dry-tons-per-day (ADTPD) of softwood bleached kraft pulp, and 1073 ADTPD of hardwood bleached kraft pulp. The potential production in the undeveloped northern forest sections⁷ is 189 MM fbm of lumber, 1084 ADTPD of softwood bleached kraft pulp, and 444 ADTPD of hardwood bleached kraft pulp. The development of access into these areas would liberate a resource with the potential to support two or three major sawmills, one large-scale softwood kraft pulpmill, and one smaller-scale thermomechanical pulp mill utilizing hardwoods. The employment opportunities associated with this increase in industrial activity would be approximately 2500 full-time jobs.

Improved utilization would also enhance the Manitoba forest potential. Changes in utilization patterns could take two directions. First, the use of aspen in processing could be increased considerably. Only about 7% of Manitoba's hard-

wood annual allowable cut (AAC) was utilized in 1979-80. A number of barriers have prevented a more complete utilization of Manitoba's hardwoods, but with the increasing scarcity (in the economic sense) of coniferous species, changing technologies, and shifting consumer preferences, hardwoods can be expected to play an increasingly important role in forest industry development. Opportunities for the increased use of hardwoods include recently developed technologies for the production of chemical-thermomechanical pulps and oriented-strand board panel products.

The second potential change in utilization patterns would be the use of smaller-diameter roundwood to produce conventional products such as softwood lumber. The development of new technologies in small-log processing provides a clear opportunity to practice closer utilization. This could be particularly important in the northern forest sections, where the majority of trees fall within smaller-diameter size classes.

The two other practices that would form major components of an overall program to capitalize on the forestry potential in Manitoba are intensive forest management and improved protection. While details of the implications of various forest management schemes and protection activities on wood supply are beyond the scope of this report, a realistic prognosis is that increased levels of silviculture activities have the potential to double the mean annual increment of Manitoba's forest land base. Also, if public investments in stand renewal, stand tending, and access development are to be productive, a greater commitment to forest protection will be necessary.

⁶ Surplus is defined as the difference between annual allowable cut (AAC) and the amount allocated to industry.

⁷ Highrock, Nelson River, and Churchill River.

Table 15. Potential industrial expansion opportunities by forest section, 1982^a

Forest section	Estimated coniferous surplus ^b	Estimated deciduous surplus ^b	Equivalent potential softwood lumber production ^d (MM fbm/annum)	Potential bleached kraft pulp production ^c	
	(cu.ft./annum)			Softwood	Hardwood
				(ADTPD ^e)	
Aspen Parkland	9 429	460 925	0	1.1	22.1
Pineland	419 783	3 953 456	1	4.4	55.2
Mountain	647 102	13 868 171	1	14.3	228.3
Lake Winnipeg East	24 778 825	11 031 500	43	236.0	154.4
Interlake	8 298 195	4 041 812	15	105.9	99.3
Saskatchewan River	7 795 847	4 371 685	14	93.8	69.5
Highrock	14 960 694	8 796 871	26	161.0	127.9
Nelson River	33 158 314	8 720 874	58	319.9	136.8
Hayes River	56 800 579	12 423 914	100	530.5	172.1
Churchill River	2 887 982	249 002	5	72.8	7.7
Total	149 756 750	67 918 210	263	1 539.7	1 073.3

^a Source: Manitoba Department of Natural Resources, Forestry Branch.^b Surplus is defined as the volume difference between determined AAC and the average amount cut by industry.^c The estimates of pulp production are based on the assumption that the remaining softwood surplus, residue chips from lumber production, and all roundwood surplus would be converted to pulp.^d Based on the general assumption that 35% of the coniferous surplus is sawlog sized and that lumber recovery is 5 fbm/cu. ft. (This conversion is less than the 6.6 fbm per cu. ft. conversion used by the authors throughout the rest of this study.)^e ADTPD: air-dry-tons-per-day.

CHAPTER III

MANITOBA'S FOREST RESOURCES

The forests of Manitoba contain about 23 092 MM cu. ft. of merchantable (4+ in. diameter at breast height (dbh)), timber on a total productive forest land area of 31.4 MM acres. The provincial government owns most of Manitoba's forest lands and so plays the leading role in forest management in the province.

Area Classification And Tenure

The total land area of Manitoba is 210 890 sq. mi. or 84% of the province's total area (Table 16). The provincial crown owns and manages 84% of the total land area of the province and private lands occupy 15% of the total land area. The remaining area is comprised of federal government lands, local government districts, and Indian reserves.

Sixty-four percent of the total land area of Manitoba is forested (Table 17). A total of 124 942 sq. mi. or 93% of Manitoba's forests are owned by the provincial crown. Of the provincial crown land, 36% (44 837 sq. mi.) is productive forest land and 7% (8662 sq. mi.) is potentially productive. The remaining 57% (71 443 sq. mi.) is nonproductive. Forest lands available for commercial timber production account for approximately 98% of all productive and potentially productive provincial crown land. The remaining 2% consists of closed or restricted areas. The productive and potentially productive provincial crown land available for commercial timber production covers a quarter of Manitoba's total land area. Of the productive and potentially productive forest land, 12% (7757 sq. mi.), is privately owned.

The conclusion that Manitoba's forests are managed solely for timber

production should be avoided, as forest lands support a variety of different uses (for example, watershed, wildlife, recreation, and grazing). As this report deals with the social and economic impact of commercial extraction of timber, these other uses are not discussed.

Forest Regions

Following Rowe's classification (Rowe 1972), the forests of Manitoba can be divided into two major forest regions, the most important of which is the boreal forest (Figure 4). Rowe (1972) identifies 10 separate boreal subtypes in Manitoba. The three most important subtypes are B.15 (Manitoba lowlands), B.21 (Nelson River), and B.22 (Northern coniferous). The predominant species in these areas is black spruce, which is found on both up-land and lowland areas. White spruce occurs on the well-drained, alluvial beds in the southern parts of the zones. Tamarack is an associated species where black spruce occurs and poplars are associated with white spruce. Jack pine is also a very important species and occurs in pure stands on sandy soils and on ridge tops throughout the three major subtypes. Frequent fires have been conducive to jack pine establishment.

The second major forest region in Manitoba is the Great Lakes - St. Lawrence Forest Region, occupying the extreme southeastern portion of the province. Rowe (1972) classifies the zone as L.12 (Rainy River). Historically, red and white pines were predominant, but extensive logging and fires have resulted in these species being almost completely replaced by jack pine. In low-lying areas, black spruce, tamarack, and eastern white cedar occur.

Table 16. Total area classification and tenure of Manitoba lands, 1982^a

Land classification	Area (sq. mi.)	Percentage of Manitoba area
Provincial crown land		
Closed	564	0.2
Open		
Forest zones and parks	52 556	20.9
Forest agreement areas	44 907	17.9
Restricted	1 163	0.5
Others		
Community pasture	100	0
Tundra and transitional zones	77 784	31.0
Tidal flats	725	0.3
Total provincial crown land area	177 799	
Federal crown land	1 162	0.5
Private lands	30 872	12.3
Local government district	240	0.1
Indian reserves	818	0.3
Total land area	210 890	
Area of water bodies	40 044	16.0
Total area of Manitoba	250 934	100.0

^a Source: Manitoba Department of Natural Resources, Forestry Branch.

Table 17. Ownership and classification of lands in Manitoba, 1982^a

Land classification	Forest land			Nonforested land	Total
	Productive	Potentially productive (sq. mi.)	Nonproductive		
Provincial land					
Closed	369	21	135	39	564
Open					
Forest zones and parks	22 926	5 122	20 431	4 076	52 555
Forest agreement areas	20 771	3 449	17 485	3 203	44 908
Restricted	711	69	208	175	1 163
Others	60	0	10	29	99
Community pasture					
Tundra and transitional	0	0	33 174	44 610	77 784
Tidal flats	0	0	0	725	725
Federal crown land	791	132	9	230	1 162
Private lands	3 097	4 660	195	22 920	30 872
Local government district	134	19	36	51	240
Indian reserves	294	94	101	328	817
Total	49 176	13 566	71 784	76 387	210 890

^a Source: Manitoba Department of Natural Resources, Forestry Branch.

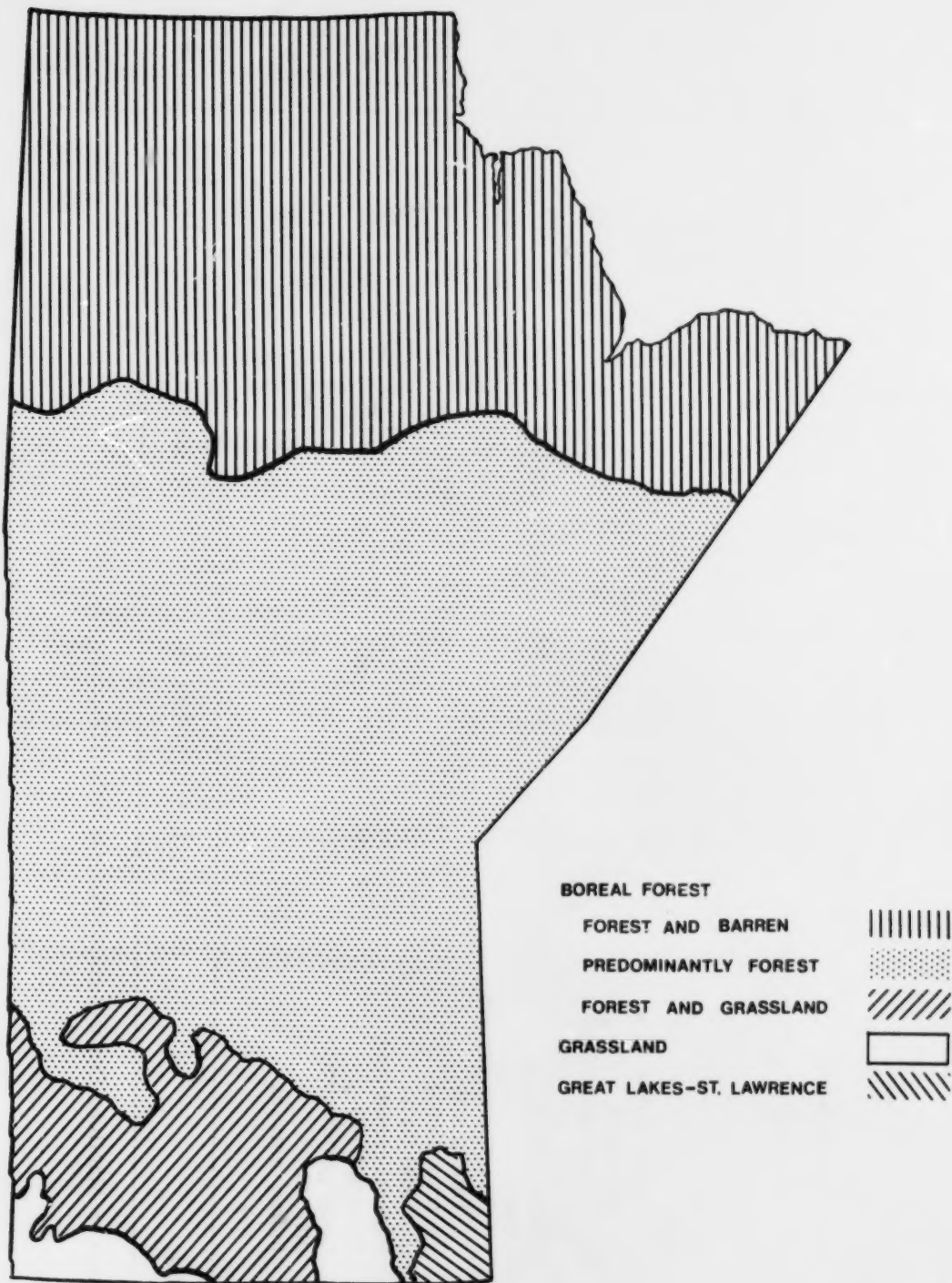


Figure 4. Classification of forest regions in Manitoba.

Volumes Of Growing Stock By Species And Forest Section

The total merchantable volume of growing stock on Manitoba's productive forest lands is 23 092 MM cu. ft. (Table 18). This total volume can be classified into the two broad species types of softwood and hardwood. Sixty-eight percent of the total volume consists of softwoods and the remaining 32% is hardwoods.

Black spruce is the most important species in Manitoba, comprising 34% of the total merchantable volume and 50% of the merchantable softwood volume. Jack pine is the second most prominent species (25% of total volume), followed closely by trembling aspen (24% of total volume). White spruce accounts for 7% of the province's merchantable growing stock.

The Hayes River forest section has the largest volume of growing stock of all of Manitoba's forest sections. Eighty-two percent of the 3945 MM cu. ft. of growing stock in this section is coniferous. The second largest is the Mountain section, with 3649 MM cu. ft. of growing stock. Hardwoods dominate this section, making up 57% of the area's total volume.

In terms of the distribution of species, Manitoba's forest sections are very diverse. This diversity is apparent when the distribution of species in the northern and southern forests is examined. In the northern forests coniferous volumes dominate while in the more southern forests, hardwoods are more prominent. For example, in the most northerly forest sections (Churchill River, Nelson River, Highrock, Hayes River, Saskatchewan River, and Lake Winnipeg East), 77% of the volume is softwood. In southern forest sections (Interlake, Mountain, Pineland, and Aspen

Parkland), 55% of the growing stock is hardwood. Broadly stated, the composition of Manitoba's forests changes from a primarily softwood forest in northern areas to more of a hardwood and mixed-wood forest in the southern areas.

Average volumes per acre also vary considerably among Manitoba's forest sections. The most productive is Mountain, with an area productivity of 1500 cu. ft. per acre. The least productive forest section is Churchill River, with an area productivity of 149 cu. ft. per acre. Average production volume for all sections of the Manitoba forest is 734 cu. ft. per acre.

The distribution of the growing stock by softwood, hardwood, and mixed cover types is shown in Table 19. On both area and volume bases, pure softwood stands dominate the Manitoba forest.

Distribution Of Growing Stock By Size Class

The merchantable growing stock in Manitoba can be categorized into two broad size classes: 4-10 in. dbh and 10+ in. dbh. The first category generally represents materials suitable for pulpwood and the second category generally represents roundwood material that is more suitable for sawlogs. The distribution of the growing stock in these size classes for the four most prominent tree species in Manitoba is shown in Figure 5. For each species the smaller size class accounts for the majority of the growing stock. For black spruce only 5% of total volume is in the 10+ in. dbh class. Jack pine, trembling aspen, and white spruce have 11%, 24%, and 52%, respectively, of their gross merchantable volume in sawlog-sized roundwood.

Approximately 11% of the province's total softwood growing stock

⁸ See Figure 1 for location of forest sections.

Table 18. Area of and merchantable^a volume on productive forest land by forest section and species (all ownerships) 1982^b

Forest section	Productive forest area (acres)	Coniferous volume (MM cu. ft.)						Total all species (MM cu. ft.)	Site productivity (cu. ft./acre)		
		Jack pine	Black spruce	White spruce	Balsam fir	Tamarack/larch	Cedar				
		Total coniferous						Deciduous ^c volume Total (MM cu. ft.)			
Aspen Parkland ^d	2 187 248	7.0	11.0	101.2	2.2	5.3	-	126.7	436.9	563.6	257.7
Pine land	1 274 982	146.6	272.3	23.5	25.7	91.1	23.9	583.1	502.0	1 085.1	851.1
Mountain ^d	2 432 661	395.5	622.8	444.5	51.7	35.3	0.1	1 549.9	2 099.0	3 648.9	1 500.00
Interlake ^d	2 459 030	243.4	302.7	89.5	81.6	23.6	0.5	741.3	635.5	1 376.8	559.9
Lake Winnipeg East	4 342 561	1 375.5	916.1	148.5	94.1	107.3	0.4	2 641.9	1 125.1	3 767.0	867.5
Saskatchewan River	1 722 056	502.1	441.0	188.9	11.7	12.5	-	1 156.2	361.7	1 517.9	881.5
Hayes River	4 890 632	1 447.6	1 658.8	85.0	51.7	5.2	-	3 248.3	696.8	3 945.1	806.7
Highrock	4 206 527	798.4	1 719.6	262.0	15.4	6.9	-	2 802.3	798.9	3 601.2	856.1
Nelson River	4 112 386	560.7	1 542.4	207.4	27.8	7.9	-	2 346.2	670.7	3 016.9	733.6
Churchill River	3 811 380	198.3	327.3	2.5	-	0.8	-	528.9	40.7	569.6	149.5
Total	31 439 463	5 675.1	7 814.0	1 553.0	361.9	295.9	24.9	15 724.8	7 367.3	23 092.1	734.5
Percent by species		24.7	33.8	6.7	1.6	1.3	-		31.9		

^a Gross merchantable volume for trees 4+-in. dbh assuming a 12-in. stump and a 3-in. top diameter (inside bark).^b Sources: Manitoba Department of Natural Resources, Forestry Branch.^c Deciduous species include trembling aspen, balsam poplar, white birch and other hardwoods, including Manitoba maple, black ash, green ash, bur oak, white elm, basswood, cottonwood, and willow.^d Forest inventory in these forest sections is currently in progress. Final reports are expected in 1984. Information presented for the Aspen Parkland section is based on 1950 estimates.

Table 19. Proportion (by area and volume) of stocked, productive, nonreserved forest land by stand type, 1982^a

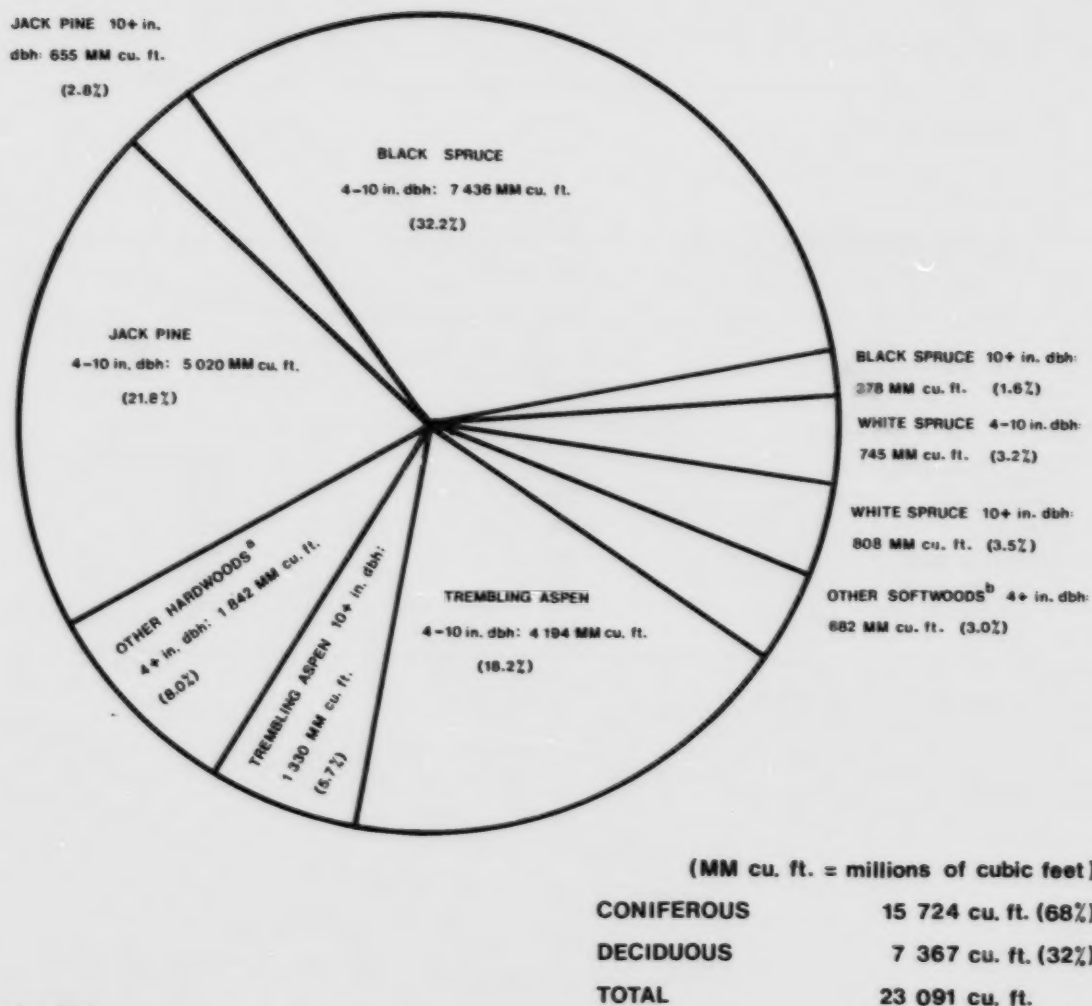
Stand type	% of total area	% of total volume
Softwood	72%	63%
Mixedwood	14%	19%
Hardwood	14%	18%
Undetermined	0%	0%

^a Source: Bonnor 1982.

Table 20. Proportion (by area and volume) of stocked, productive, nonreserved forest land by maturity class, 1982^a

Maturity class	% of total area	% of total volume
Regeneration	10%	0%
Immature	72%	58%
Mature	17%	38%
Overmature	1%	4%
Uneven-aged	0%	0%
Undetermined	0%	0%

^a Source: Bonnor 1982.



FOOTNOTES:

^a OTHER HARDWOODS include white birch, balsam poplar, manitoba maple, black ash, green ash, bur oak, american elm, basswood, cottonwood, and willow.

^b OTHER SOFTWOODS include balsam fir, tamarack, and eastern cedar.

SOURCE: Manitoba Department of Natural Resources, Forestry Branch.

Figure 5. Distribution of the growing stock on provincial forest lands by size class.

and 25% of the hardwood volume are of the larger diameter class. Fourteen percent of the total provincial growing stock (all species combined) is sawlog-sized material.

Distribution Of Growing Stock By Maturity Class

The relative distribution of stocked productive nonreserved forest land by maturity class is shown in Table 20. In terms of area and volume, the majority of the Manitoba forest is in the immature age category, however, a significant portion (42% of the total volume) is in the mature and overmature age categories. The volumes in these latter classes occur on 18% of the stocked productive non-reserved forest land base.

Forest Production In The 1970s

In the fiscal year 1961-62, a total of 37 601 758 cu. ft. of roundwood was harvested from Manitoba lands (Teskey and Smyth 1975a). Fifty-five percent of this volume was harvested from provincial crown lands and 45% was harvested from federal crown and private lands. A considerable transition occurred in the following decade in both the pattern and the level of the annual harvest. In 1971-72 the total harvest had increased to 56 115 000 cu. ft., 84% of which was harvested from provincial crown land (Table 21). In the period following 1971, the trends toward increased total harvests and increased proportion of total harvest from provincial crown land continued. In 1980-81 the total cut was 82 530 000 cu. ft., over 99% of which was harvested from provincial crown land. Clearly, provincial crown land has become the major source of trees for the primary wood-using industry.

The total harvest from provincial crown lands in 1980-81 was 81 929 582

cu. ft. The approximate regional distribution⁹ of the total cut is shown in Figure 6. A large portion (42%) of the annual harvest from provincial crown lands is taken from the northwestern part of the province. The second most heavily utilized area is the west-central part of the province, which accounts for 23% of the total harvest on provincial crown land.

Distribution by product of the provincial crown land harvest for the period 1970-1981 is shown in Table 22. (The information in Tables 21 and 22 was obtained from the Annual Reports of the Department of Natural Resources from 1970-71 to 1981-82.) Over the 12-year period shown in Table 22, pulpwood was the major product harvested, accounting for 62% of the total cut. Sawlogs accounted for 32% of the total cut. In the 1981-82 fiscal year the sawlog and pulpwood harvests accounted for 30% and 62%, respectively, of the total provincial crown land harvest. The remaining roundwood products accounted for only 8% of the harvest.

Annual Allowable Cut

Davis (1966, pg. 100) describes forest regulation as follows:

The essential requirements of a fully regulated forest are that age and size classes be represented in such proportion and be consistently growing at such rates that an approximately equal annual or periodic yield of products of desired size and quality may be obtained. There must be a progression of size and age classes so that harvestable trees in approximately equal volume are regularly available for cutting.

⁹ These regions do not correspond to the administrative units called forest sections in Figure 1.

Table 21. Annual harvests in Manitoba from 1970 to 1981 ('000 cu. ft.)

Fiscal ^a year	Provincial		Other		Total harvest
	Crown	% of total harvest	Private & federal	% of total harvest	
1970-71	37 221	81.9	8 228	18.1	45 449
1971-72	47 286	84.3	8 829	15.7	56 115
1972-73	55 514	84.5	10 206	15.5	65 720
1973-74	56 115	85.8	9 323	14.2	65 438
1974-75	68 227	89.7	7 804	10.3	76 031
1975-76	65 367	89.3	7 840	10.7	73 207
1976-77	53 678	85.5	9 111	14.5	62 789
1977-78	58 162	90.1	6 427	9.9	64 589
1978-79	60 528	92.7	4 803	7.3	65 331
1979-80	68 511	99.1	636	0.9	69 147
1980-81	81 928	99.3	600	0.7	82 528
1981-82	62 931	99.1	565	0.9	63 496

^a April 1 to March 31 for year indicated.

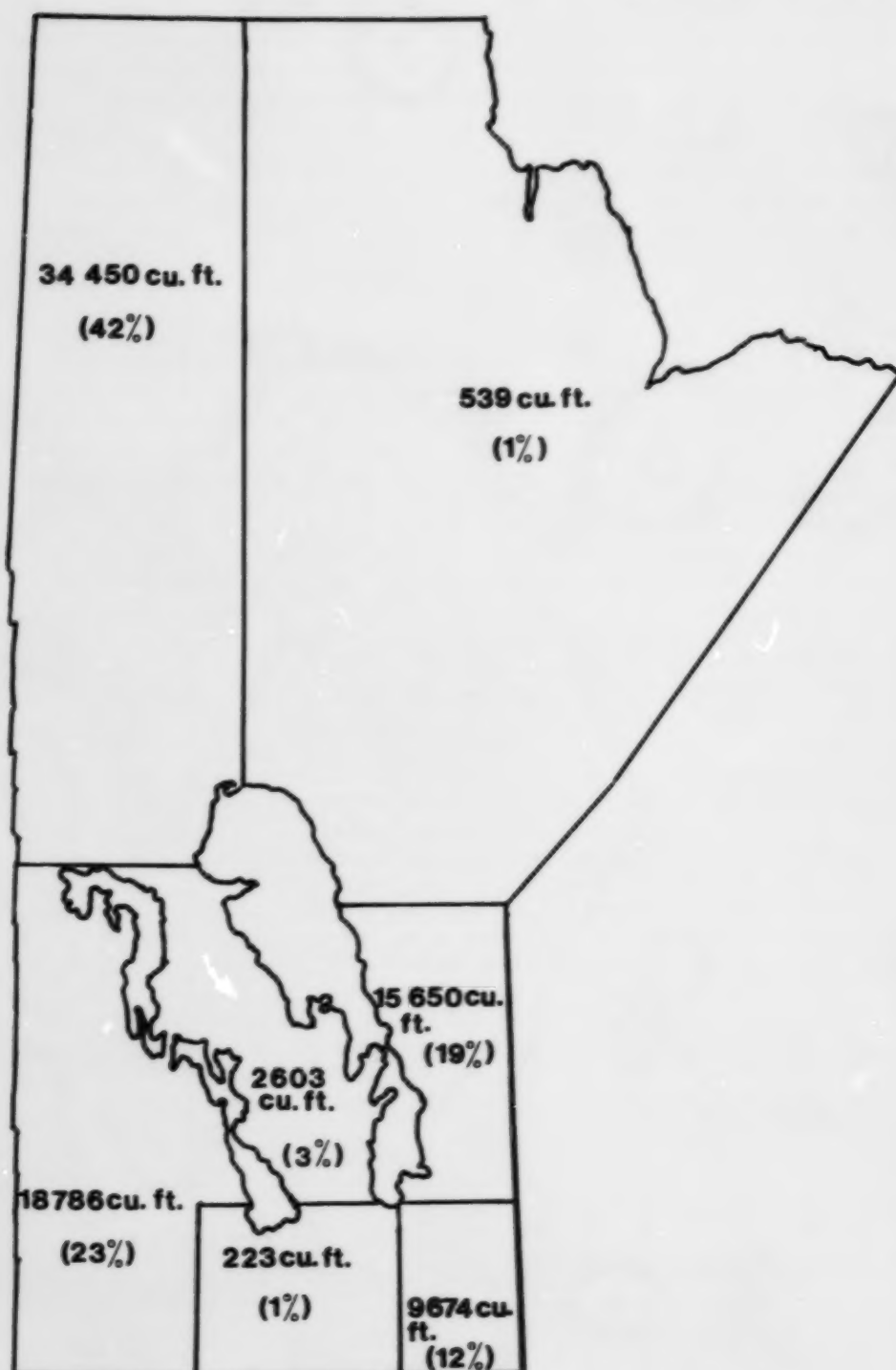


Figure 6. Approximate regional distribution of the Manitoba harvest, 1980-81.

Table 22. Distribution of products from provincial crown lands from 1970 to 1981 ('000 cu. ft.)

Fiscal Year	Lumber coniferous	Lumber deciduous	Round timbers, poles, posts	Pulpwood coniferous	Pulpwood deciduous	Fuel- wood	Railway ties	Mining timbers	Total
1970-71	6 992	3 355	1 519	21 824	1 836	459	424	812	37 221
1971-72	11 089	2 825	1 059	29 311	2 083	530	71	318	47 286
1972-73	15 856	4 238	1 872	30 970	1 730	494	71	283	55 514
1973-74	19 564	4 344	1 589	28 146	1 695	318	106	353	56 115
1974-75	14 090	2 931	2 295	46 368	1 201	494	424	424	68 227
1975-76	13 879	2 472	1 907	44 743	1 342	459	353	212	65 367
1976-77	17 551	1 730	1 660	30 618	883	812	212	212	53 678
1977-78	17 904	1 836	1 801	33 125	918	2 013	318	247	58 162
1978-79	18 646	2 507	1 730	32 948	1 201	2 860	177	459	60 528
1979-80	19 176	3 673	1 730	38 316	1 413	3 743	177	283	68 511
1980-81	20 941	3 143	2 613	50 358	1 130	3 390	141	212	81 928
1981-82	16 209	2 684	1 766	38 316	565	3 108	177	106	62 931

Thus the purpose of the fully regulated normal forest is to provide an even, annual flow of timber on a sustained basis. Central to the concept of the regulated forest is the determination of the annual allowable cut (AAC). Determining the level of the allowable cut is the principal means by which the forest is transformed into the regulated condition required for continuous and stable timber supply.

The Manitoba AAC is determined by an area allotment method. This procedure allows sufficient flexibility to permit the Manitoba Forestry Branch to take factors such as utilization and the economic feasibility of extraction, conversion, and marketing into consideration in establishing resource supply.

The AAC and annual actual cut from open provincial crown land by forest section is shown in Table 23. Each forest section has a surplus of unallocated timber. The proportion of unallocated allowable cut is particularly high for deciduous fiber. Only 7% of the hardwood AAC for provincial crown lands is being harvested, and large hardwood surpluses exist in each forest section. Only 27% of the softwood AAC for provincial crown lands is utilized. The annual softwood harvest could potentially be 3.7 times the current levels.

Part of the reason for incomplete utilization of existing AACs lies in the fact that some of the surplus volumes occur in inaccessible areas. This inaccessibility accounts for 60% of the softwood

surplus. For example, the Churchill River, Nelson River, and Hayes River forest sections have significant volumes of timber, but almost completely lack developed transportation systems. Forest areas considered to be commercially accessible given the existing transportation network are shown in Figure 7. The Manitoba Forestry Branch has estimated that the surplus softwood AAC within these areas will be fully allocated by the year 2000 and that timber shortages will begin to appear by then. Given the length of rotation periods in the province (80 years or more), the period of time remaining until the year 2000 is not a particularly long planning horizon for addressing the anticipated timber shortages.

The annual actual cut in the seven forest sections with developed access is about 58% of their total AAC (Table 23), with about 39.3 million cu. ft. remaining in merchantable softwood surplus. Although this surplus is located in forest sections with developed access, other factors contribute to it remaining economically unexploitable. These factors include small diameters, low volumes per acre, improper species for particular purposes, and distribution of stands where preferred stands are intermingled with unproductive or noncommercial stands. In summary, the impression of overriding timber surpluses provided by province- or section-wide AAC figures is misleading due to the economic inaccessibility of a significant proportion of the unallocated surplus.

Table 23. Estimated annual allowable cut (AAC), actual cut, and estimated timber surpluses by forest section^a

Forest section	Estimated AAC ('000 000 cu. ft.)	Actual cut ('000 000 cu.ft.)	% of AAC	Estimated surplus ('000 000 cu. ft.)
Coniferous				
Aspen Parkland	0.0	0.0	0	0.0
Pineland	6.3	5.9	93	0.4
Mountain	11.3	10.7	94	0.6
Interlake	9.8	1.5	16	8.3
Lake Winnipeg East	33.4	8.6	26	24.8
Saskatchewan River	15.9	8.1	51	7.8
Hayes River	56.8	0.0	0	56.8
Highrock	34.2	19.2	56	15.0
Nelson River	33.6	0.5	1	33.1
Churchill River	2.9	0.0	0	2.9
Total	204.2	54.5	27	149.7
Deciduous				
Aspen Parkland	0.5	0.0	0	0.5
Pineland	6.4	2.4	37	4.0
Mountain	15.9	2.0	13	13.9
Interlake	4.1	0.0	0	0.0
Lake Winnipeg East	11.5	0.5	4	11.0
Saskatchewan River	4.4	0.0	0	4.4
Hayes River	12.4	0.0	0	12.4
Highrock	8.8	0.0	0	8.8
Nelson River	8.7	0.0	0	8.7
Churchill River	0.2	0.0	0	0.2
Total	72.9	4.9	7	68.0
Total all species	277.1	59.4	21	217.7

^a Source: Manitoba Department of Natural Resources, Forestry Branch.

^b Annual cut by the forest industry is the average over the 5-year period from 1975-1980.

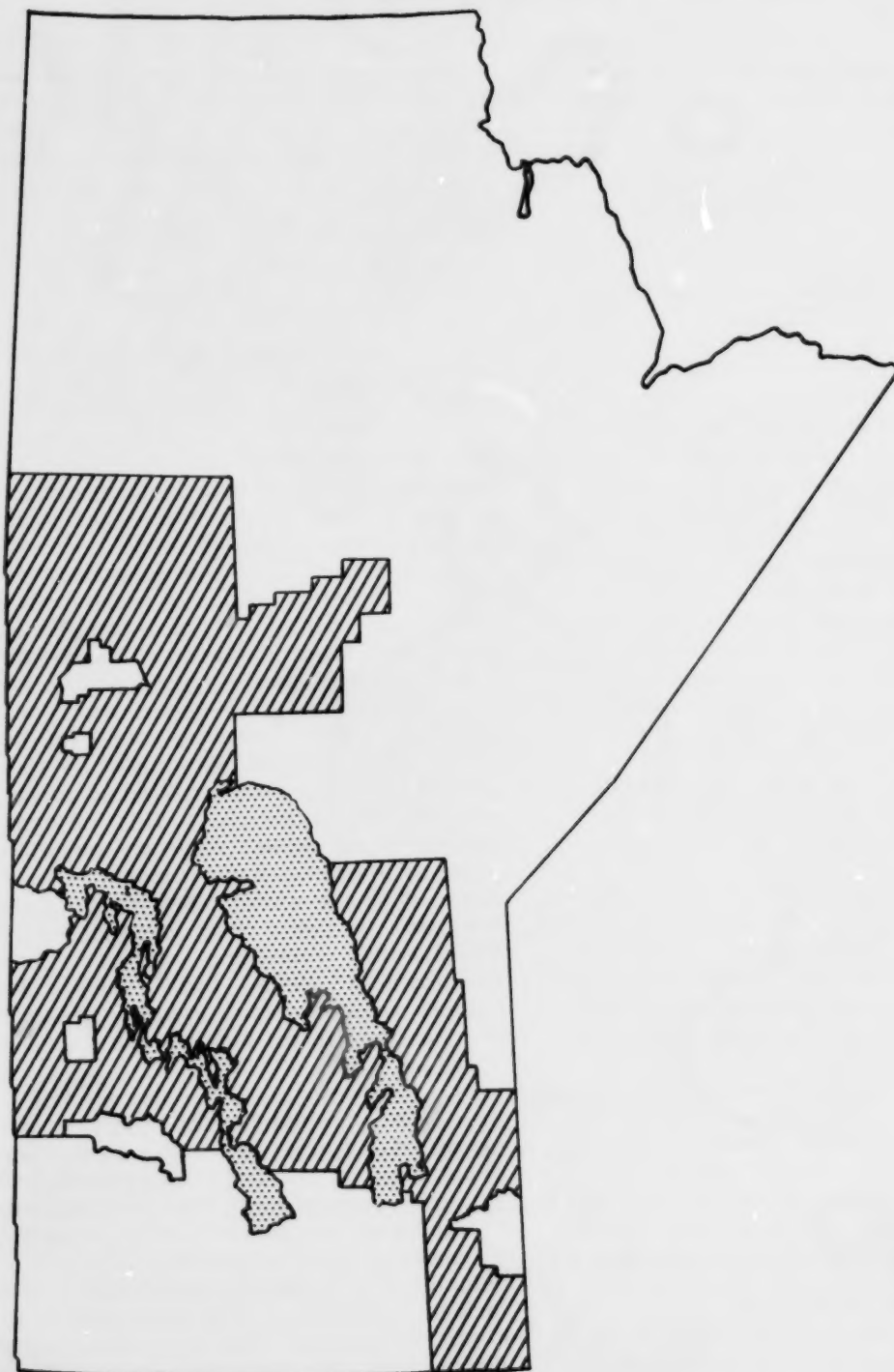


Figure 7. Commercial forest area in Manitoba.

CHAPTER IV

CAPITAL IN THE FOREST INDUSTRY

This chapter describes the nature and role of capital, one of the primary factors of production in the forest industry. Lipsey et al. (1973, pg. 334) provides the following definition of capital which is appropriate to this discussion:

Capital is a man-made factor of production. The supply of capital in a country (or a firm) consists of the stock of existing machines, plant, equipment, etc. This capital is used up in the course of production, and the stock is thus diminished by the amount that wears out each year. However, the stock of capital is increased each year by the production of new capital goods. Because new capital equipment is rarely the same as the capital it replaces, the nature of society's (or the firm's) stock of capital is constantly changing.

For the purposes of this study, capital is defined as the stock of real, physical, man-made goods that are required for producing forest products. Examples of these physical goods are assorted machinery, buildings, and haul roads.

The Capital Stock In Manitoba's Forest Industry

The original intent of this report was to describe the stock of capital in Manitoba's forest industry using traditional measures of replacement value and book value. Replacement value is the cost of replacing all machinery, roads,

and buildings with similar forms of new capital. This value best represents the absolute differences in capital stock among firms and among industry groups and is insensitive to the age of capital within and among firms. Book value is the depreciated value of the firm's capital stock and is quite sensitive to age of capital.

In the process of collecting data on the Manitoba forest industry, the need for a third measure of capital stock became evident. Many of the small single-proprietorship sawmills did not require the sophisticated accounting procedures commonly used among the larger incorporated firms. Also, in many cases the equipment used by these mills had been either completely rebuilt or built entirely with spare parts. As a result, when questioned about replacement and book value the operators of these mills could not provide appropriate measures. These operators were, however, aware of the resale value of their existing equipment, so a new category was created to accommodate this situation. This category measures the market value or the resale value of the firm's capital stock. Market value is most closely related to book value as it is also a rough measure of the equipment's remaining service life. Replacement value, book value, and market value for each industry group in the Manitoba forest industry are shown in Table 24.

The original NoFRC questionnaire classified capital into six categories: 1) buildings, plant, and storage facilities; 2) mill machinery and equipment; 3) woodland machinery and equipment; 4) mobile yard equipment; 5) motor vehicles; and 6) haul roads. Because of a lack of response and the requirements of confidentiality, the proportionate distribution of capital among these

Table 24. Replacement, book, and market value of the capital stock in Manitoba's forest industry, 1979-80

Industry group	Number of firms	Replacement value (\$000)	Book value ^a (\$000)	Market value ^a (\$000)
Sawmills				
5 MM fbm and over	5	25 600 ^b	18 000	IR
1 MM to 5 MM fbm	19	6 827	4 500	IR
100 M to 1 MM fbm	43	6 144 ^c	IR	1 685
Less than 100 M fbm	109	8 197 ^d	IR	1 124
Total sawmills	176	46 768	-	-
Independent planing mills	5	1 037	750	IR
Wood preservation mills	2	1 857 ^e	X	X
Miscellaneous industry group				
Building logs	5	900	700	IR
Pallets	9	3 021	2 300	IR
Post and poles	5	IR	IR	IR
Pulp, paper, and fiberboard mills	4	557 000 ^f	X	X
Total all groups	206	610 583	-	-

^a These values include some estimation to account for mills that did not respond.

^b Assumes \$20 000 000 replacement value for the Manfor sawmill.

^c Assumes \$142 884 replacement value per mill.

^d Assumes \$75 202 replacement value per mill.

^e Assumes \$357 000 replacement value for wood preservation equipment integrated with sawmill.

^f Assumes \$225 000 000 replacement value for Manfor pulp and paper mill.

IR Insufficient response.

X Confidential.

categories could be provided only for sawmills (Table 25). The seemingly low proportion of capital in woodlands machinery and equipment for large sawmills is due to the significant amount of timber logged by private contractors.

The stock of capital in the Manitoba forest industry is constantly changing. Each year a certain proportion of the stock of capital is depleted by use and new capital is added through investment. Annual depletion of the capital stock is measured by depreciation, and annual capital and repair expenditures measure the formation of new capital or repairs to the existing capital stock. Annual depreciation and annual capital and repair expenditures in Manitoba's forest industry are shown in Tables 26 and 27.

Financial Aspects Of Capital

The capital stock in the forest industry is formed as the result of the investment of private and public funds. Private investors have five principal sources of investment funds: personal savings, stocks, bonds issues, debt financing, and retained earnings. Government relies on the same five sources with the exception that Crown revenues are substituted for private savings.

The debt/equity ratio of a firm depends on the proportion of investment capital accumulated from each source. Capital funds accumulated from stock issues, reinvested profits, personal savings, or crown revenues are defined as equity capital. Although debt/equity ratios could not be obtained for the Manitoba forest industry, the proportion of the value of total appraised assets in

outstanding debt for a cross section of firms was obtained.¹⁰ Outstanding debt accounted for 5.6% of the asset value of the cross section of firms.

Productivity

Productivity is defined by Bannock et al. (1978) as follows:

A measure of the rate at which output flows from the use of given amounts of factors of production... In practice, productivity is usually measured by expressing output as a ratio to a selected input. The input selected will give its name to the productivity measure, e.g., labor productivity, capital productivity, and land productivity.

Sandoe and Wayman (1977) and Manning and Thornburn (1971) identified a number of determinants of increases in productivity in the Canadian forest products industries. They included technological innovation, work-study leading to improved efficiency, incentive and bonus schemes, industrial training, standardization of techniques, rationalization, returns to scale, profitability assessment, and more capital-intensive production processes. Some of these causes affect the productivity of a particular factor of production directly and some indirectly. Each of the causes allows the operator to become more technically or economically efficient. For three of these causes of improved productivity (innovation, returns to scale, and capital intensity), the form and quantity of the capital stock are the determining factors.

¹⁰ The cross section included 3 large sawmills, 12 medium sawmills, 21 small sawmills producing from 100 M to 1 MM fbm annually, 2 small sawmills producing less than 100 M fbm annually, 2 planer mills, 1 miscellaneous, building paper, and roofing mill, and 1 fiberboard plant. The total replacement value of these mills is \$52 million, and represents about 11% of the total replacement value of all forest industry capital.

Table 25. Distribution of capital stock in the Manitoba sawmill industry group, 1979-80

Sawmill Class	Buildings, plant and storage (%)	Mill machinery and equipment (%)	Woodland, ^a machinery and equipment (%)	Mobile yard equipment (%)	Motor vehicles (%)	Haul roads (%)	Total replacement Value (\$000)
5 MM fbm and over	26	35	5	17	13	4	25 600
1 MM to 5 MM fbm	10	24	31	17	15	3	6 827
100 M to 1 MM fbm	11	23	34	15	15	2	6 144
Less than 100 M fbm	1	45	18	8	27	1	8 197

^a Does not include capital owned by logging contractors.

Table 26. Annual depreciation in the forest industry by industry group and forest section, 1979-80

Industry group	Annual depreciation (\$000)	Forest section	Annual depreciation ^a (\$000)
Sawmills			
5 MM fbm and over	1 109	Aspen Parkland	5 178
1 MM to 5 MM fbm	371	Pineland	589
100 M to 1 MM fbm	430	Mountain	942
Less than 100 M fbm	138	Interlake	145
		Lake Winnipeg East	2 505
		Saskatchewan River	2 745
Total sawmill industry	2 048		
Independent planing mills			
	200	Hayes River	b
Wood preservation mills			
	IR	Highrock	20
Miscellaneous wood-using industry group			
	IR	Nelson River	19
Pulp, paper, and fiberboard mills			
	9 898	Churchill River	b
Total	12 146		12 146

^a Excludes miscellaneous wood-using industry group and wood preservation plants.^b Not applicable.

IR Insufficient response.

Table 27. Annual capital and repair expenditures for plant machinery and equipment in the Manitoba forest industry, 1979-80

Industry group	Capital	Repairs	Forest section	Capital ^a	Repairs ^b
	(\$000)			(\$000)	
Sawmills					
5 MM fbm and over	52.7	780.8	Aspen Parkland	215.0	41.0
1 MM to 5 MM fbm	103.1	154.1	Pineland	154.3	237.7
100 M to 1 MM fbm	205.9	106.5	Mountain	161.0	550.2
Less than 100 M fbm	IR	IR	Interlake	83.7	30.3
Total sawmill	361.7	1 041.4	Lake Winnipeg East	27.8	10.6
Independent planing mills			Saskatchewan River	43.8	183.0
Miscellaneous and wood preservation plants	20.5	17.2	Hayes River	c	c
			Highrock	9.6	4.9
	389.8	IR	Nelson River	24.9	8.1
Pulp, paper, and fiberboard	IR	IR	Churchill River	c	c

^a Excludes less than 100 M fbm sawmills and pulp, paper, and fiberboard mills.

^b Excludes sawmills producing less than 100 M fbm pulp, paper, and fiberboard mills, miscellaneous mill, and wood-preservation operations.

^c Not applicable.

IR Insufficient response.

The quantity and quality of capital employed in production processes clearly have a direct bearing on the efficiency and competitiveness of a firm. A useful introductory approach to describing the relationships between capital and productivity is to compare three separate ratios: output per unit labor (Q/L), output per unit capital (Q/K), and capital per unit labor (K/L) (Table 28).

Specific statements about factors contributing to improved productivity among industry groups cannot be drawn from the information presented in Table 28 as products and technologies are nonhomogeneous. The values are simply aggregate representations of each Manitoba forest industry group. The table shows that the pulp, paper, and fiberboard industry group is the most capital-intensive group in the Manitoba forest industry, with a capital stock per employee of around \$437 000. This industry group also produces the most value added per employee. Large sawmills, the most capital-intensive sawmill industry group, produce a greater value added per employee than the medium mills. The least capital-intensive industry group (miscellaneous and wood preservation) produces among the lowest outputs per own employee. There appears, therefore, to be a general relationship between output per unit of labor and capital per unit of labor.

As noted above, the values provided in Table 28 should not be used to

describe interindustry differences in factor productivities due to the absence of uniformity of products and technologies among the industry groups. General statements can nonetheless be made by comparing interregional or temporal ratios for a single industry group producing a relatively homogenous product using relatively similar production methods. These ratios are provided in Table 29 for the sawmill industry group.¹¹ The table shows output per unit of labor¹¹ in 1972 to 1978-79 and 1979-80 for the sawmill industries in Alberta, Saskatchewan, and Manitoba.

Three general observations can be drawn from the data shown in this table. First, labor productivity is generally higher in larger mill categories. Second, with the exception of Saskatchewan mills, the current sawmill labor force is more productive than it was in 1972. Third, considerable interregional differences in labor productivity can be observed. As noted earlier, there are a number of possible explanations for these differences. Although each of these causes may have some effect on productivity, increasing returns to scale and the use of technologically improved production methods are likely among the more important influences.¹²

The productivity-improving influence of increasing scale (i.e., increasing returns to scale) in Canadian sawmills has been documented by Dobie (1973) and Gray (1981).¹³ Table 30 shows the un-

¹¹ Output per unit of labor (Q/L) in Table 29 is measured in terms of board feet (fbm) of lumber produced per sawmill worker (in person-years). The ratio is therefore different than Q/L in Table 28, which shows total value added per person-year (including woodlands employees).

¹² Returns to scale show the relative increases in physical output associated with a change in inputs. For example, if output more than doubles after all inputs are doubled, then there are increasing returns to scale.

¹³ These authors actually describe the related concept of economies of scale, a concept that describes the relative impact on average costs (rather than physical output) of changing scale.

Table 28. Factor productivity indexes and capital-labor ratios by forest industry group, 1979-80

Industry group	Output ^a per unit labor ^b Q/L (\$)	Output ^a per unit capital ^c Q/K (\$)	Capital per unit labor K/L (\$)
Sawmills			
5 MM fbm and over	37 970	571	60 896
1 MM to 5 MM fbm	20 242	691	29 300
100 M to 1 MM fbm	13 726	d	d
Less than 100 M fbm	11 173	d	d
Total sawmills	27 703		
Independent planing mills	42 141	1 341	31 424
Miscellaneous and wood preservation mills	26 216	989	26 505
Pulp, paper, and fiberboard	53 723	123	437 206

^a A unit of output is \$1 worth of value added.

^b A unit of labor is one person/year (own employees only).

^c A unit of capital is equal to \$1000 of replacement capital.

^d The total replacement values indicated in Table 24 are based on the replacement values of a modern mill. Because this technology is not comparable to the actual methods employed by small mills, capital-labor and output-capital ratios are not provided.

Table 29. Regional and temporal differences in labor productivity for sawmills on the prairies (1972 to 1978-79, 1979-80)

Province and sawmill group	1972 ^a	1978/79, 1979/80 ^b
	M fbm per person-year ^c	M fbm per person-year
Alberta		
5 MM fbm and over	320	364
1 MM to 5 MM fbm	168	289
100 M to 1 MM fbm	228	191
Saskatchewan		
5 MM fbm and over	356	334
1 MM to 5 MM fbm	357	112
100 M to 1 MM fbm	332	161
Manitoba		
5 MM fbm and over	232	261
1 MM to 5 MM fbm	233	193
100 M to 1 MM fbm		

^a Source: Teskey and Smyth 1975a, b, and c.

^b The Alberta ratio is for 1978-79; Saskatchewan and Manitoba ratios are for 1979-80.

^c Person-year is defined as one person working in the sawmill on a year-round basis. This value does not include woodlands employees.

Table 30. Average^a shift capacities for sawmills producing more than 5 MM fbm per year

Region	1972	1978-79, 1979-80 ^c
	M fbm per shift	M fbm per shift
Alberta	66.5	81.0
Saskatchewan	120.7	94.2 ^d
Manitoba	53.7	65.0

^a Averages are unweighted.

^b Source: Teskey and Smyth 1974.

^c The Alberta average is for 1978-79. Saskatchewan and Manitoba averages are for 1979-80.

^d The reason for the decline in average shift capacity is that three mills with relatively low capacities were included in the calculation for Saskatchewan in 1970-80. Two of these mills were crown-owned and the third was integrated with a wood-preservation plant.

weighted mean sawmill capacities per shift for large sawmills (mills producing greater than 5 MM fbm per year) in each prairie province in 1972 to 1978-79 and 1979-80. Mills in Manitoba and Alberta show an increase in average capacity over the period. This increase corresponds to an increase in Q/L in both provinces (Table 29). This trend to larger average capacity per shift, in association with increased labor productivity suggests the presence of increasing returns to scale in sawmills in Manitoba and Alberta.

In Saskatchewan, however, average sawmill capacity declined between 1972 and 1979-80. Associated with this decline is a 6% decrease in average labor productivity over the period.¹⁴ There thus appears to be a relationship between labor productivity and sawmill scale. This also implies the probable existence of increasing returns to scale as productivity is higher in larger mills. This analysis, however, lacks the detail required to the either confirm the occurrence of increasing returns to scale or to indicate optimum sawmill size.

The productivity improvements shown in Table 29 can not be solely attributed to increasing returns to scale. Some of the interregional or intertemporal differences in Q/L ratios occur as the result of the use of improved processing technologies. Sawmill equipment is not the same for all mills; some mills use circular headsaws while others use band, quad, or gang saws for primary

log breakdown. Still other mills utilize the recently developed Chip-N-Saw equipment. This diversity can be observed both through time and in a cross section of mills at one point in time. The recent document entitled Review of the Canadian forest products industry (Department of Industry, Trade and Commerce 1978, p.144), describes the impact of technology as follows:

Real output per manhour in sawmills and planing mills grew at an annual rate of 3.5 percent from 1964 to 1976, reflecting the shift in production from small mills to larger, more efficient production units and the increased use of high volume, small-log processing systems in the industry.

In summary, considerable differences in physical output per person-year can be seen in sawmills over time or across regions. In Manitoba the productivity of mill labor increased almost 13% in the period between 1972 and 1979-80. In spite of this increase, Manitoba sawmills still had the lowest Q/L ratios of the three prairie provinces. Two factors (returns to scale and differing technologies) explain the differences in productivity, but the extent to which productivity differences can be attributed to each of these influences requires further empirical investigation.

¹⁴ Smaller (and relatively less productive) sawmills were constructed between 1972 and 1979-80 in Saskatchewan. Job creation rather than competitiveness was the primary factor in the decision to construct these smaller mills.

CHAPTER V

EMPLOYMENT IMPACT OF THE FOREST INDUSTRY

In 1980, the forest industry in Manitoba provided direct employment (in terms of full person-years)¹⁵ to 2879 workers. To determine the total employment impact of the industry, however, indirect employment must also be calculated. In the process of producing forest products, the forest industry purchases intermediate goods and services from other industrial or retail sectors. As a result, additional production and jobs are generated in these sectors. These jobs are attributable to the initial forest industry activity and are classified as indirect employment. Other sources of indirect employment include the jobs created to satisfy the demands for goods and services generated by forest industry employees.

The purpose of this chapter is to identify both the direct and indirect employment impact of forest industry activity. A number of other characteristics of forest industry employment are also presented, including seasonality of employment, employment status, length of employment, work force stability, native employment opportunities, organized labor, and the regional distribution of forest industry employment. The final section of the chapter measures the total direct and indirect employment impact of forest industry activity by providing and applying employment multipliers for each industry group.

Employment By Industry Group

Table 31 shows the distribution of total direct forest industry employment by industry group. In terms of total employment impact, the pulp, paper, and fiberboard industry group dominates the

Manitoba forest industry, accounting for 52% of total employment. Of the total 2879 jobs created by the forest industry, 62% were located at the processing site and 38% were involved in logging operations.

Large sawmills

This category consisted of five establishments that operated year-round in 1980. They created about 585 full-time jobs directly, which represented 57% of the entire sawmill labor force. Average monthly employment in logging and manufacturing for these sawmills is illustrated in Appendix 3, Figure A. Employment in manufacturing held steady at about 300 workers year round, but employment in logging activities associated with these mills fluctuated widely. It was highest from October to March, with approximately 327 workers being employed, declining to a low of 100 in April and May.

Medium sawmills

The 19 mills in this category accounted for 30% of the total sawmill work force and 10% of the total forest industry employment. Most of the sawmills in the group operated year-round in 1980. Employment for the year averaged 286 workers, peaking at 401 in January and dropping to 241 in April (Appendix 3, Figure B). In woodlands operations about 160 workers were employed from January to March. During the summer 90 workers were employed in logging. Employment in manufacturing was reasonably stable at approximately 180 workers throughout the year, except in January and February, when it dropped to about 140 workers.

¹⁵

A full person-year is defined as one person working 8 hours per day, 5 days per week, 52 weeks per year (or 2080 hours per year).

Table 31. Employment by forest industry group, 1979-80

Industry group	Person-years of employment			% of forest industry
	Woodlands	Mill	Total	
Sawmills				
5 MM fbm and over	258	327	585	20
1 MM to 5 MM fbm	113	173	286	10
100 M to 1 MM fbm	40	68	108	4
Less than 100 M fbm	16	30	46	2
Independent planing mills	1	33	34	1
Wood preservation mills	17	25	42	2
Miscellaneous mills	10	174	184	6
Pulp, paper, and fiberboard mills	526	969	1 495	52
Independent log producers	99	N / A	99	3
Total	1 080	1 799	2 879	100 ^a

^a Logging is 38% and mill 62%.
N/A Not applicable.

In this period, logging was the prevailing activity. Planing was carried out during the summer and fall months.

Small sawmills producing 100 M to 1 MM fbm annually

This sawmill category accounted for 10% and 4% of the total sawmill and forest industry work forces, respectively. Although a number of these mills operated year-round, many of them were limited to winter or part-time summer operations. Winter logging supported a peak of 80 workers in January, but the annual average did not exceed 40 workers (Appendix 3, Figure C). Product manufacturing was performed principally in the spring and summer with a peak employment of about 103 workers.

Small sawmills producing less than 100 M fbm annually

This category contained the greatest number of sawmills (109), but only supported 4% of total sawmill industry employment. Milling and logging activities accounted for 30 and 16 person-years of employment, respectively. The majority of the mills in this category are owner-operated and sawmilling is often an activity supplemental to the primary occupation of the entrepreneur. In most cases production was retained by the operator for his own use or sold in local markets. In general, logging activity for these mills occurred from January to March (Appendix 3, Figure D), while manufacturing activities peaked in the period from April to June.

Independent planing mill industry group

There were five independent planing mills operating in 1980, all of which were in production year-round. Employment in the planing mills remained constant throughout the year at about 34 workers (Appendix 3, Figure E).

Wood preservation industry group

Seasonal fluctuations in employment for the wood preservation group are illustrated in Figure F of Appendix 3. Employment in this group averaged 42 persons. January to March was the period of minimum employment. Difficulties encountered in the preservation process (such as frozen wood, high cost of heating oil, and inadequate wood supply) led to a reduction in manufacturing activity during this period.

Miscellaneous industry group

The firms in this industry group included five building timber, nine pallet and container, and five post and pole plants. Average monthly employment in the building timber plants was about 28 workers in logging and manufacturing combined. The pallet and container plants provided employment to an average of 151 workers per month. All of these workers were employed in processing activities as all wood inputs for pallet and container production were purchased from other sources. The post and pole plants were small operations providing employment to about five workers on a year-round basis. Logging was generally carried out during winter, while manufacturing took place through the summer. Sporadic increases in demand resulted in logging and manufacturing being carried out simultaneously on some occasions.

Pulp, paper, and fiberboard industry group

This group consisted of a newsprint

mill, a kraft paper mill, and two building products plants. Employment in these four mills was very stable in 1980 with an average monthly employment during the year of about 526 workers in logging operations and about 969 in manufacturing. All but one of the firms obtained wood inputs using their own logging operations; Building Products Ltd. purchased its wood inputs from independent sources. Harvesting operations in this group remained strong during the summer, a marked departure from the situation typical in other industry groups. The stability of seasonal employment in the pulp, paper, and fiberboard industry group is shown in Figure G, Appendix 3.

Seasonality Of Employment

Logging, skidding, and log hauling in Manitoba are predominantly seasonal activities. These operations are usually carried out during the period from mid-October to the end of March, though summer logging is increasing. Figure 8 shows that woodlands employment was at its highest during the winter season, with 1286 persons working in January. The number of persons employed dropped sharply during spring breakup, remaining low until October. In April, only 861 persons were employed in woodlands operations.

The overall employment level at the processing sites of the industry remained fairly stable throughout 1980. Total monthly employment averaged 1799 workers and ranged from a low of around 1710 workers in February to a high of around 1875 in May.

Employment Status

The Manitoba forest industry employed predominantly its own workers in woodlands and primary processing operations, however, 487 workers were employed as contractors. These contract employees represented 45% of the industry's woodlands employees and 17% of the total forest industry work force.

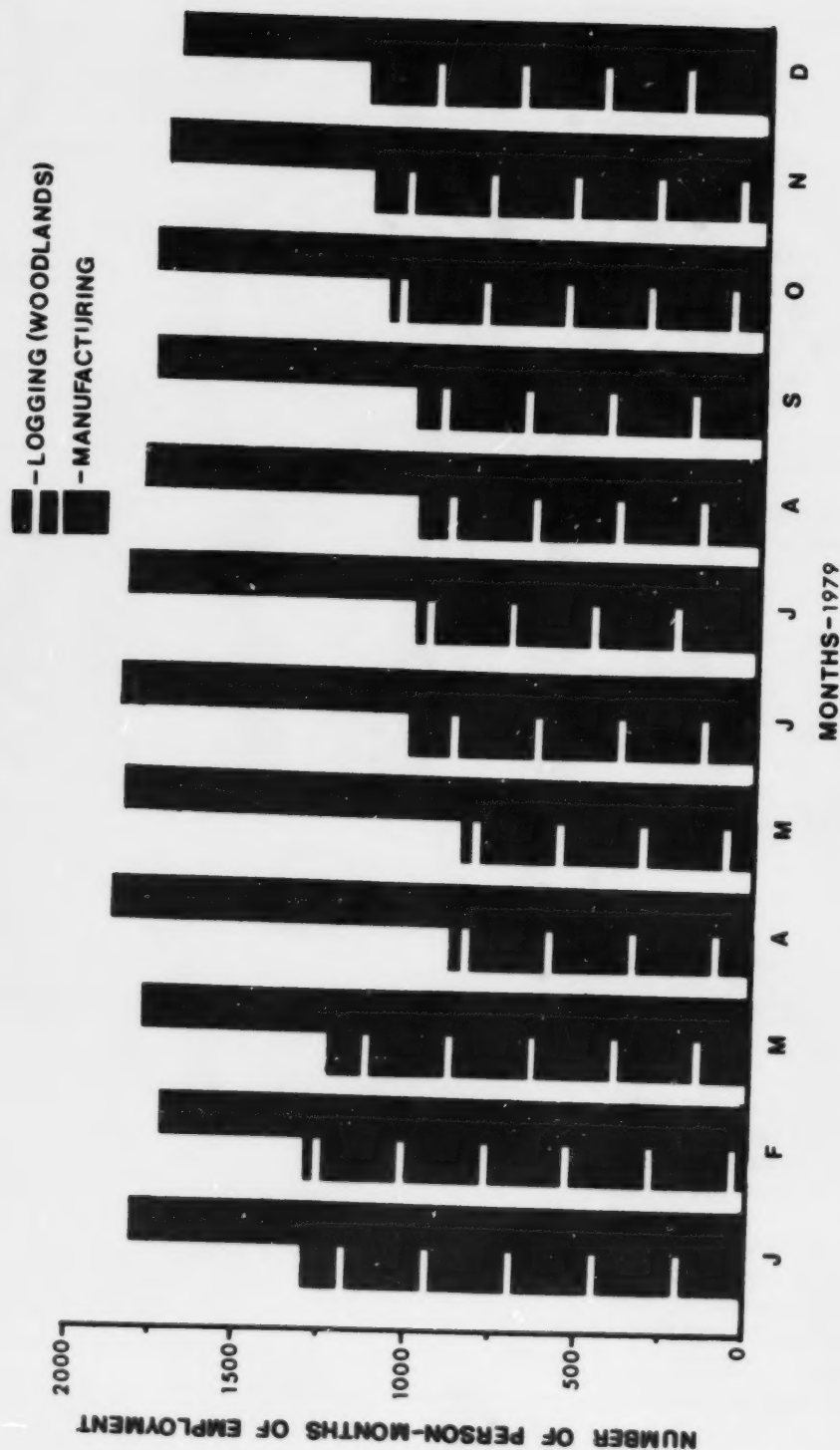


Figure 8. Seasonal changes in the number of workers employed in logging and manufacturing in the forest industry of Manitoba, 1979-80.

Table 32. Contract employee activity by forest industry group, 1979-80

Industry group	Cutting	Skidding	Hauling	Total
	Person-years			
Sawmills				
5 MM fbm and over	83	79	38	200
1 MM to 5 MM fbm	25	11	17	53
100 M to 1 MM fbm	3	1	0	4
Less than 100 M fbm	0	0	0	0
Total	111	91	55	257
Independent planing mills	0	0	1	1
Wood preservation	2	2	2	6
Miscellaneous	0	0	2	2
Pulp, paper, and fiberboard	105	84	32	221
Total	218	177	92	487

Table 33. Hourly paid employees by forest industry group, 1979-80

Industry group	% of employees paid hourly
Sawmills	
5 MM fbm and over	53.4
1 MM to 5 MM fbm	58.4
100 M to 1 MM fbm	75.7
Less than 100 M fbm	68.7
Independent planing mills	36.2
Wood preservation	57.4
Miscellaneous	97.8
Pulp, paper, and fiberboard mills	70.4

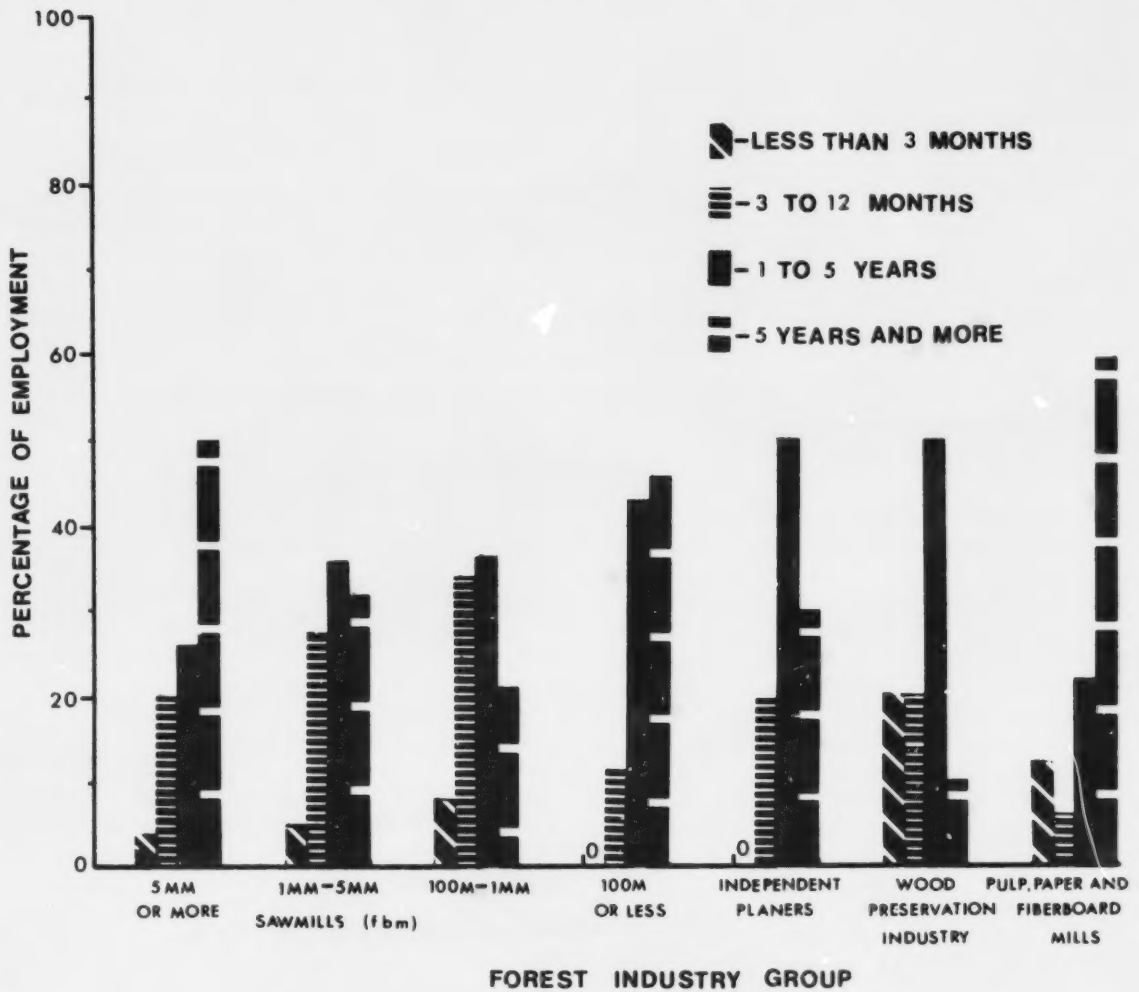


Figure 9. Length of employment by forest industry group, 1979-80.

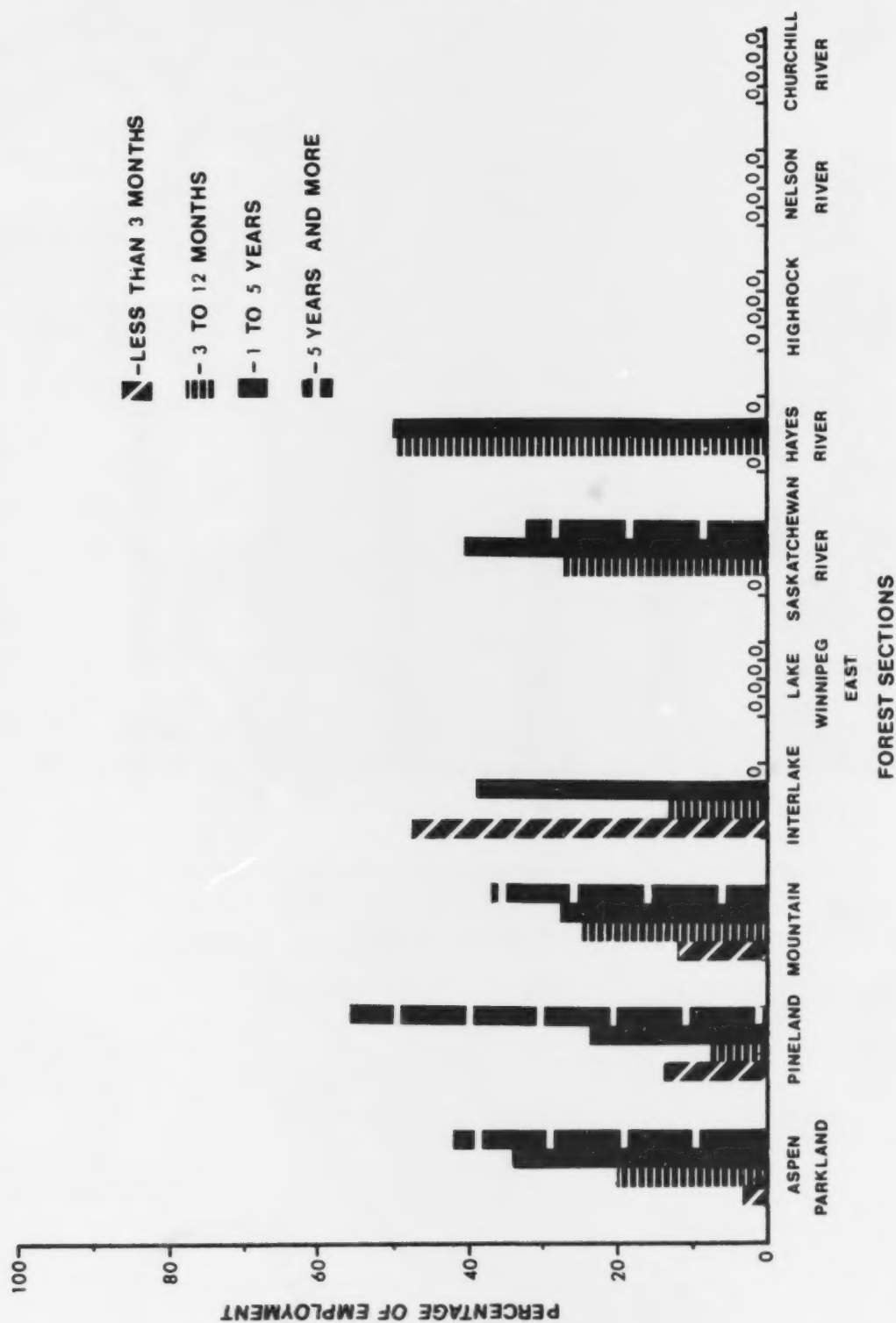


Figure 10. Length of employment by forest section, 1979-80.

Table 32 shows the distribution of woodlands contract workers by the type of activity undertaken (i.e., logging, skidding, or hauling).

Most of Manitoba's forest industry employees were paid on an hourly basis; more than 50% of employees were paid on an hourly basis in all industry groups except the independent planing mill industry group (Table 33). Management, supervisory, and office and sales staff were the primary occupations paid on a salary basis.

Length Of Employment

At least 50% of the labor force in the large sawmill and pulp, paper, and fiberboard industry groups had been with the same company for more than 5 years (Figure 9). In medium and small sawmills and in independent planing mills the proportion of workers with similar employment records ranged from 23-47%.

On a regional basis, forest industry firms in the Aspen Parkland, Pineland, and Mountain forest sections were able to retain roughly 40% or more of their labor force for at least 5 years (Figure 10). The industry work force was relatively more unsettled in the Interlake forest section, where almost half of the forest industry employees had been with the same employer for less than 1 year.

Labor Supply Difficulties

Although Manitoba's forest industry is generally well-supplied with labor, some establishments did indicate some degree of difficulty in obtaining more highly skilled workers (Table 34). For example, tradespeople (electricians, mechanics, plumbers, welders, and millwrights) were in short supply for sawmills and for firms in the pulp, paper, and

fiberboard group. These occupations comprise a small but vital portion of the forest industry work force. Two of the four mills in the pulp, paper, and fiberboard industry group indicated they had some difficulties in obtaining skilled workers for their mill operations. Thirty-seven percent of medium sawmills had labor supply difficulties at the mill. Figure 11 shows, on a regional basis, the proportions of firms with labor supply problems. Not surprisingly, the more-remote Highrock forest section had the greatest proportion of firms with labor supply difficulties.

Native Employment In The Forest Industry

Manitoba's forest industry provides good employment opportunities for persons of native ancestry.¹⁶ Forestry is a rural activity with activities located in or close to areas settled by native populations. As a result, the forest industry provides employment opportunities for native persons in locations reasonably close to their places of residence.

In 1979-80, 625 jobs or 22% of the total forest industry employment opportunities were occupied by native persons. Fifty-two percent of this work force was engaged in woodlands operations and the remaining 48% was employed at the primary processing site. Table 35 shows the distribution of native employment by industry group. The large sawmills employed about 28% of the native workers in the forest industry, while the pulp, paper, and fiberboard group accounted for 41%.

The Nelson River forest section had the highest degree of native participation in forest industry employment (Figure 12). One hundred percent of logging and almost 60% of mill employees in that section were of native ancestry. In

¹⁶ Persons considered to be of native ancestry are status and nonstatus Indians and Metis.

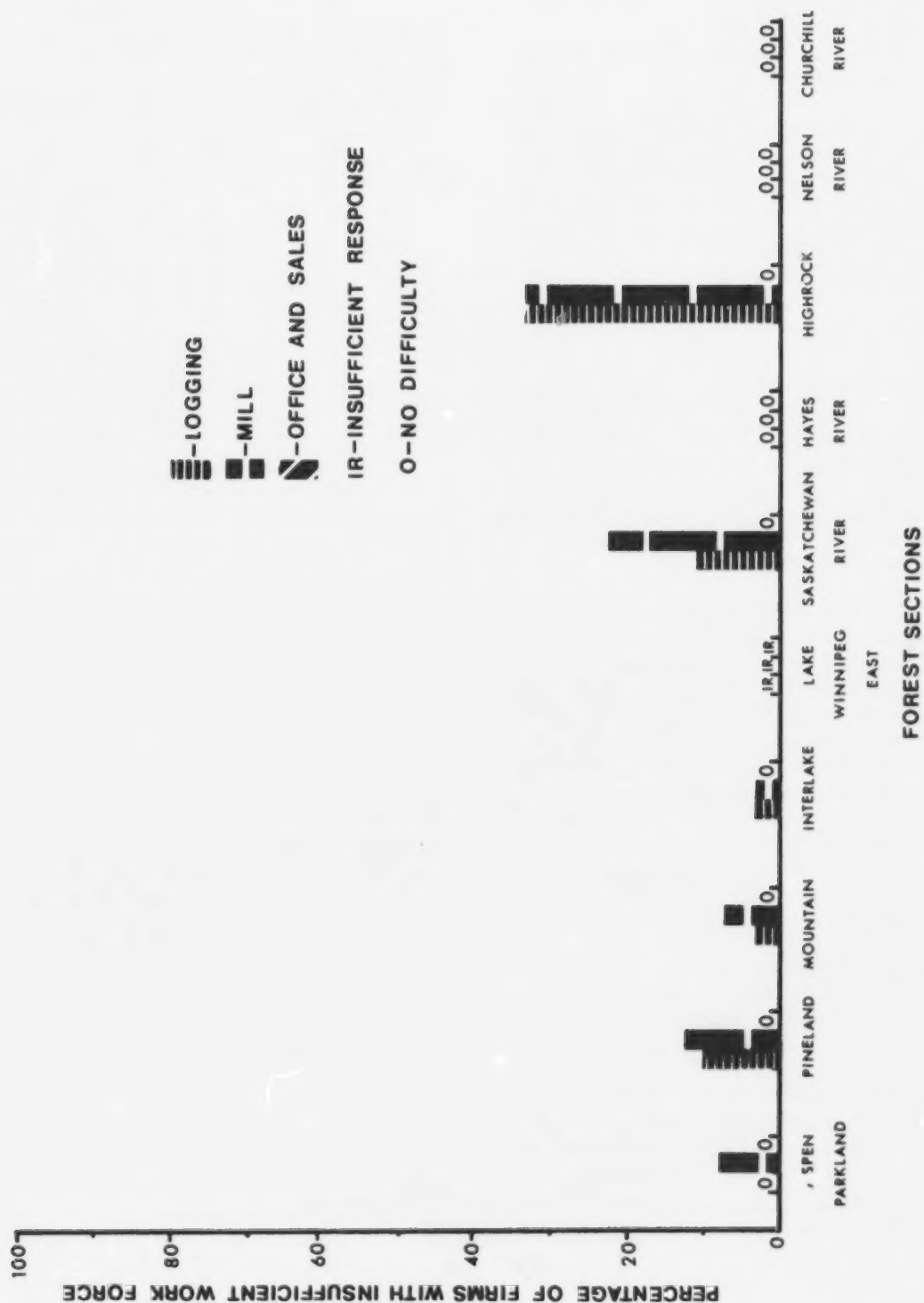


Figure 11. Labor supply difficulties by forest section, 1979-80.

Table 34. Worker supply for the forest industry, 1979-80^a

Industry group	Woodlands workers	Mill workers	Office and sales workers
Sawmills			
5 MM fbm and over	20	20	0
1 MM to 5 MM fbm	16	37	0
100 M to 1 MM fbm	9	12	0
Less than 100 M fbm	IR	IR	IR
Independent planing mills	IR	IR	IR
Wood preservation	X	X	X
Miscellaneous	IR	IR	IR
Pulp, paper, and fiberboard mills	0	50	0
Independent log producers	IR	b	IR

^a By percentage of firms with difficulties attracting and retaining workers.

^b Not applicable.

IR Insufficient response.

X Confidential.

absolute terms, firms in the Saskatchewan River forest section employed the greatest number of native employees, followed by firms in the Mountain forest section (Table 36).

Organized Labor In The Forest Industry

Sixty-six percent of Manitoba's forest industry labor force was unionized in 1979-80 (Table 37). In the sawmill group, 67% of the employees working in large sawmills and 17% of those working in medium mills were represented by unions. In the pulp, paper, and fiberboard group, 97% of the workers were organized in unions.

Regional Employment Impact Of The Forest Industry

Forest industry employees were not evenly distributed throughout the province of Manitoba. Table 38 shows the distribution of forest industry workers by forest section. The Saskatchewan River forest section clearly led all other sections in terms of employment, accounting for 37% of total forest industry jobs. The Lake Winnipeg East forest section was second with 23% of total employment. On a broad zonal basis the five northern sections of Saskatchewan River, Nelson River, Highrock, Hayes River, and Churchill River accounted for 38% of total employment. The mid-province

Table 35. Native employment^a by forest industry group, 1979-80

Industry group	Total industry employment			Native employment		
	Logging	Mill	No.	Logging	Mill	% of industry total
Sawmills						
5 MM fbm and over	258	327	83	32	93	28
1 MM fbm to 5 MM fbm	113	173	41	36	62	36
100 M fbm to 1 MM fbm	40	68	9	23	22	32
Less than 100 M fbm	16	30	2	13	3	10
Total for sawmills	427	598	135	32	180	30
Other forest products						
Independent planing mills	1	33	0	0	3	9
Wood preservation plants	17	25	9	53	7	28
Miscellaneous mills	10	174	4	40	22	13
Pulp, paper, and fiberboard mills	526	969	170	32	86	9
Independent log producers	99	N/A	9	9	N/A	N/A
Total all mills	1 080	1 799	327	30	298	17

^a In person-years.
N/A Not applicable.

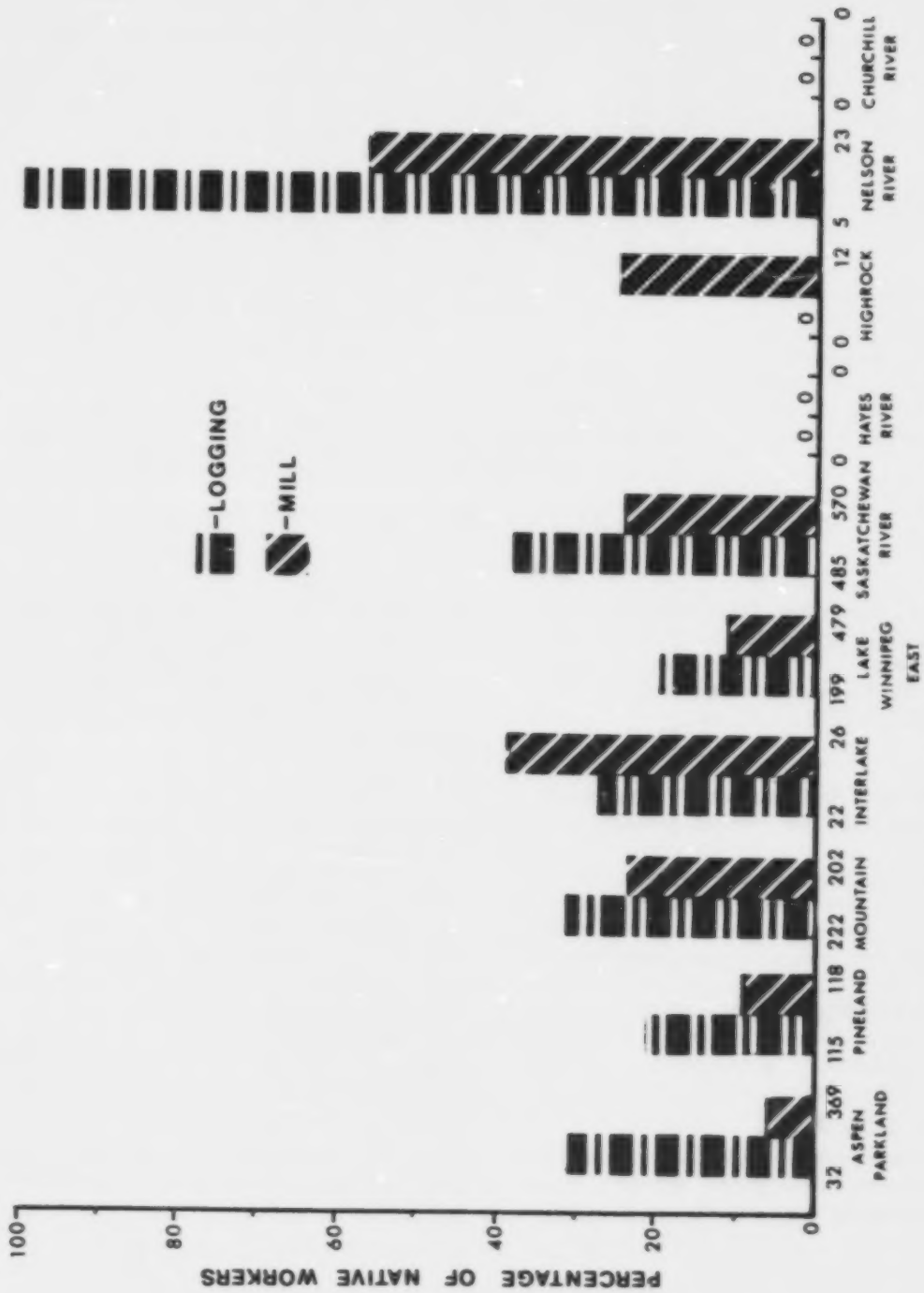


Figure 12. Native employment participation by forest section, 1979-80.

Table 36. Native employment by forest section, 1979-80^a

Forest section	Woodlands workers	Mill workers	Total number of natives employed
Aspen Parkland	10	23	33
Pineland	14	11	25
Mountain	69	48	117
Interlake	6	10	16
Lake Winnipeg East	40	54	94
Saskatchewan River	183	136	319
Hayes River	0	0	0
Highrock	0	3	3
Nelson River	5	13	18
Churchill River	0	0	0
Total	327	298	625

^a In person-years.

sections of Mountain, Interlake, and Lake Winnipeg East accounted for 40% of total employment. The southern forest sections of Aspen Parkland and Pineland accounted for 22% of all jobs.

Total Direct And Indirect Employment Impact Of The Forest Industry

As described in the introduction to this chapter, the forest industry is not an isolated component of the Manitoba economy. Forest industry activity creates demands for industrial goods and services produced by other sectors of the provincial economy. In addition, the incomes of forest industry employees further increase the economic impact through lo-

cal expenditures on household goods and services. The proportion of purchases for locally produced (as opposed to externally produced) goods and services directly influences the dimension of the indirect impact of forest industry activity.

One way to measure the indirect economic impact of an industrial activity is to quantify the secondary or indirect employment that results from the initial activity. The procedure for determining the secondary employment impact¹⁷ is to derive an employment multiplier. A complete explanation of the various ways that employment multipliers are defined and empirically derived is beyond the scope of this study, however, a general discussion of the concept is necessary.

¹⁷ An employment multiplier is a value that when multiplied by the total direct employment in a given industry indicates the total direct and indirect employment generated by that industry in the region.

Table 37. Organized labor in the Manitoba forest industry,^a 1979-80

Industry group	Number unionized	% of total employees	Name of local or association
Sawmills 5 MM fbm and over	394	67	International Woodworkers of America International Union of Operating Engineers Firm-specific union
1 MM to 5 MM fbm	49	17	International Woodworkers of America
Pulp, paper, and fiberboard industry group	1 454	97	International Woodworkers of America United Paper Workers International Firm-specific union
Total	1 897	66	

^a The following industry groups do not employ unionized labor: small sawmills, independent planing mills, wood preservation mills, miscellaneous mills, and independent log producers.

Table 38. Employment by forest section, 1979-80

Forest section	Person-years of employment			% of total forest industry
	Woodlands	Mill	Total	
Aspen Parkland	32	369	401	14
Pineland	115	118	233	8
Mountain	222	202	424	15
Interlake	22	26	48	2
Lake Winnipeg East	199	479	678	23
Saskatchewan River	485	570	1 055	37
Hayes River	0	0	0	0
Highrock	0	12	12	a
Nelson River	5	23	28	1
Churchill River	0	0	0	0
Total	1 080	1 799	2 879	100

^a Less than 1%.

Table 39. Employment multipliers from other studies

Industry group	Estimated multiplier	Location
Logging	1.69 ^a	Ontario
Sawmills and planing mills	2.15 ^a	Ontario
Plywood plants	2.21 ^a	Ontario
Miscellaneous	2.29 ^a	Ontario
Pulp and paper	2.28 ^a	Ontario
Pulp, paper, and allied	2.43 ^b	Prince George, B.C.
Forest industry groups	2.49 ^b	Okanagan, B.C.
Forest industry groups	2.80 ^b	B.C. (province-wide)

^a Source: Ontario Ministry of Natural Resources 1981.

^b Source: F.L.C. Reed and Associates Ltd. 1973.

There are two distinct approaches for the estimation of employment multipliers. These include: a) the "customary economic-base regional multiplier type (derived by the firm-by-firm method) and b) multipliers originating from a regional input-output framework" (Isard 1960). Employment multipliers derived using the first approach reflect the combination of two unique (although sometimes inseparable) multiplier effects. These effects are defined by Isard (1960) as follows: a) "the first type of multiplier is determined by the extent to which the final export products contain or utilize intermediate products locally manufactured", and b) "the second type of multiplier is the Keynesian-type multiplier dependent on changes in local income flows and determined by the consumption habits of employees of the export industry."

From this definition, two features of economic base employment multiplier effects are apparent. First, the stimulus for the multiplier effect occurs from the sale of goods to markets outside the region (i.e., exports). Second, the size of the multiplier effect is dependent on the degree to which company income and employee income is spent within the boundaries of the regional economy.

Multipliers derived from an input-output framework show the direct and indirect impacts (measured in dollars) of unit increases in final demand in the sector being analyzed. Component categories of final demand include consumption of final goods, government expenditures, investment, inventory additions, and exports. The indirect effect portion of the multiplier is the combined increase in sales of all sectors associated with a one-dollar increase in final demand for the sector in question. This is the linkage effect. The income expenditure patterns of company employees and the resulting indirect effects are accounted for by direct inclusion of the household sector within the structural portions of the input-output model.

In order to convert the income-type multipliers (measured in dollar units) to an employment-type multiplier, Isard (1960, p. 627) suggests:

- 1) to set down the change in output for each sector from all direct and indirect effects considered, 2) through the use of an input-output coefficient which indicates the requirement of man-hours per unit of output to convert the change in output for each sector to change in employment, 3) to sum the change in employment over all sectors, and 4) to compute the ratio of this sum to the direct employment required to produce that amount of output corresponding to the change in final demand.

As discussed earlier, the empirical determination of specific employment multipliers for the various sectors of the Manitoba forest industry has not been done for this study, though multipliers specific to the forest industry in other provinces have been calculated, (F.L.C. Reed and Associates Ltd. 1973, Ontario Ministry of Natural Resources 1981) (Table 39). In this report, employment multipliers for selected forest industry groups in Manitoba (Table 40) are estimates based on the multipliers provided for other provinces, with minor adjustments to reflect Manitoba conditions. The resulting multipliers should be viewed only as approximations.

Some basic assumptions pertain to the application of the approximated multipliers. They are as follows: a) that each and every direct job created in the forest sector caused an indirect impact (not just the employment associated with export activity); b) that expenditure patterns of forest industry firms are roughly equivalent between the bench mark regions and

Table 40. Direct and indirect employment^a impact by forest industry group, 1979-80

Industry group	Direct forest industry employment	Estimated industry multiplier	Indirect employment	Total employment
Sawmills				
5 MM fbm and over	585	2.0	585	1 170
1 MM to 5 MM fbm	286	2.0	286	572
100 M to 1 MM fbm	108	2.0	108	216
Less than 100 M fbm	46	2.0	46	92
Independent planing mills	34	2.0	34	68
Wood preservation mills	42	2.0	42	84
Miscellaneous industry group	184	2.5	276	460
Pulp, paper, and fiberboard mills	1 495	2.5	2 242	3 737
Independent log producers	99	2.0	99	198
Total	2 879		3 718	6 597

^a Person-years.

Manitoba; c) that expenditures of company employees have been included as one of the indirect effects; d) that expenditure patterns of households are equivalent between the bench mark regions and Manitoba; e) that the population of the region increases (or decreases) proportionately to increases (or decreases) in the final demand sector of the regional economy; and f) that income expenditure patterns of new members of the population (induced by increases in final demand) are similar to established members of the population.

Table 40 shows the indirect employment resulting from direct forest industry employment by industry group. The average employment multiplier for the aggregate forest industry is estimated to be 2.3. This means that for each job in the Manitoba forest industry, 1.3 jobs are created elsewhere in the province's economy. The total employment impact in 1979-80 was 6597 person-years of employment, 2879 being direct and 3718 being indirect.

CHAPTER VI

CAPACITY AND PRODUCTION OF THE FOREST INDUSTRY

There were 206 forest industry firms operating in Manitoba in 1979-80.¹⁸ Table 41 indicates the regional distribution of the forest industry. The Mountain forest section had a strong industry presence, with 71 firms or one-third of all forest industry establishments in the province located in that region. Although most of the forest industry operations in this region were small sawmills, there were also three large and six medium sawmills. The majority of the remaining forest industry firms were equally distributed among the Aspen Parkland, Pineland, and Interlake forest sections. Small sawmills were again the most numerous but some medium sawmills were present. One large sawmill was located in the Pineland forest section.

A significant portion of the industry was located in the west-central part of the province (Saskatchewan River forest section). Only a few firms were located in the northern forest sections of Highrock and Nelson River, and no firms were located in the Churchill River and Hayes River sections. The low number or complete absence of forest industry firms in these sections reflects the high costs of production and limited local demand.

The distribution of forest industry production is shown in Table 42. Five large sawmills, representing less than 3% of all sawmills, produced about 63% of the lumber output. The large sawmills also produced 100% of the province's wood chips. The 19 medium sawmills (11% of sawmills) manufactured about 24% of total lumber production. The 43 small sawmills producing 100 M to 1 MM fbm annually produced almost 11% of the province's lumber while the 109 small firms producing less than 100 M fbm annually accounted for only 2% of total

lumber output.

Independent planing mills are market- or consumer-oriented and are located primarily in regions with a high demand for the use of planed lumber. Two large independent planing mills were located in Winnipeg and a third large mill was located at Blumenort, about 30 miles southeast of the capital. This industry group accounted for only about 13% of the total output of dressed lumber in the province. The rest of the province's dressed lumber was produced at larger sawmills that had integrated planing capabilities.

The two large wood preservation plants were located in southern Manitoba, close to the centre of the provincial market. Of the five building timber plants, two were located in southern Manitoba and three were in the Saskatchewan River forest section. They produced for both local and export markets. All but one of the pallet plants were located in Winnipeg. The large pallet plants produced primarily pallets, but they also produced a variety of other products, including boxes, bed frames, door and window jambs, sidings, and moldings. The two largest post and pole plants, both of which were located in southern Manitoba, produced 70% of the total post and pole output. The balance was produced by three smaller plants.

The two major industrial facilities in the Manitoba forest industry included a thermomechanical pulp and newsprint mill at Pine Falls and a kraft pulp and paper mill at The Pas. Their markets were primarily in western Canada and in the midwestern United States. The two building products mills manufactured exterior sheathing, roof insulation, and

¹⁸ This figure does not include independent log producers.

Table 42. Distribution of firms by production and by forest industry groups, 1979-80

Industry group	Firms		Production (MM fbm unless otherwise noted)	Wood chips (BDU) ^a
	(No.)	(%)		
Sawmills				
5 MM fbm and over	5	2	85.315	10 158
1 MM to 5 MM fbm	19	9	32.081	0
100 M to 1 MM fbm	43	21	14.510	0
Less than 100 M fbm	109	53	2.927	0
Total sawmills	176	85	134.833	10 158
Independent planing mills	5	2	16.315	
Wood preservation	2	1	1 306 M cu. ft.	
Miscellaneous				
Building timber	5	2	374 M cu. ft.	
Pallet plants	9	4	18.140	
Post and pole plants	5	2	64 M cu. ft.	
Pulp, paper, and fiberboard	4	2	321 524 tons, 20 000 M sq. ft. ^b	
Total all groups	206	98 ^c		

^a 1 BDU (bone dry unit) = 2400 lb. of bone dry wood chips.

^b 1/2-in. basis.

^c Total does not add to 100 because of rounding.

roofing products for local, Canadian, and export markets. These mills were located in Winnipeg.

Total production and the regional distribution of forest industry output by product type during 1979-80 is shown in Table 43.

Normal Output And Engineered Capacity

The productive potential or installed capacity of Manitoba's forest industry firms at any point in time is directly related to the industry's stock of capital. The stock of capital of a particular firm consists of all buildings, equipment, and machinery used in the production process. The producing capability of a firm depends on the number, size, and type of these capital items, and on how they are arranged in the production line. Collectively, these capital items and their arrangement are termed the technology of the firm. The installed capacity of the firm is functionally dependent on this technology.

Installed process capacity means "the maximum output obtainable under normal technological and market conditions" (Statistics Canada 1978, p.6). Process capacity, as opposed to rated machine capacity, defines the production capability of the entire production line. Rated machine capacity relates to the production potential of particular machines (virtually in isolation from integrated components in the production line).

As previously defined, installed capacity represents the maximum productive capability of the firm, assuming full utilization of the capital stock. Frequently, however, the stock of capital

may be less than fully utilized. Statistics Canada (1978, p.5) states:

The stock of capital in place typically is not used with the same degree of intensity over the year. Recently, increasing attention has been focused on the measurement of productive potential and the extent to which it is realized. This capacity utilization measurement is an interesting way of examining the relationship between the total resources available and the level of potential output.

Capacity utilization rates measure the extent of under-utilization of capital stock and shows the "gap between potential and actual use" of the capital stock (Statistics Canada 1978). The primary source of under-utilization are imbalances between demand and installed capacity at given points in time.

Average installed capacity, average normal output, and capacity utilization rates (operating ratios) for the various forest industry groups in Manitoba are shown in Table 44. The capacity utilization rates in Table 44 are derived by dividing the average output per shift (or per day) by the average¹⁹ process capacity per shift (or per day). Among the sawmill industry group, the large sawmill class had the highest capacity utilization with average per shift output at 76% of process capacity in 1979-80. Capacity utilization in medium and small sawmills was 6-7% lower than in large sawmills. Planing mills operating as part of a sawmill-planing mill complex generally attained operating ratios of 2-5% higher than the sawmill. The reason

¹⁹ A number of alternative methods have been developed for measuring capacity utilization. The Department of Industry, Trade and Commerce employs a procedure called the Wharton School Trend-through-Peak Estimation Procedure. Statistics Canada capacity utilization measures are based on capital-output ratios (Statistics Canada 1978).

Table 43. Output of forest products in 1979-80 by product type and forest section^a

Product	Forest section										Total Production
	Aspen Parkland	Pineland	Mountain	Interlake	Lake Winnipeg East	Saskatchewan River	Hayes River	Highrock	Nelson River	Churchill River	
Dimension lumber—M fbm	15 050	9 314	29 510	5 500	3 775	59 750	0	330	930	0	124 159
Boards—M fbm	4 295	6 004	6 568	697	133	422	0	0	270	0	18 439
Timbers—M fbm	2 790	4 399	571	643	0	2 082	0	110	300	0	10 895
Ties (unpreserved)—M fbm	0	2 028	740	0	0	963	0	0	0	0	3 731
Preserved lumber—M fbm	3 600	0	689	0	0	0	0	0	0	0	4 289
Pallets and containers—M fbm	16 940	0	0	0	0	0	0	0	1 200	0	18 140
Machined lumber—M fbm	8 230	0	0	0	0	0	0	10	0	0	8 240
Lath—M fbm	45	0	13	0	0	0	0	0	0	0	58
House logs—M cu. ft.	0	0	33	329	0	18	0	0	0	0	380
Posts (unpreserved)—M cu. ft.	62	200	503	63	12	1	0	0	1	0	842
Poles (unpreserved)—M cu. ft.	0	6	0	0	0	10	0	0	0	0	16
Sawlogs—M cu. ft.	0	574	462	12	0	162	0	0	0	0	1 510
Pulpwood—cords	1 300	56 506	52 414	1 933	3 988	3 470	0	5 500	0	0	125 111
Preserved posts and poles —M cu. ft.	396	0	330	0	0	0	0	0	0	0	726
Rails—M cu. ft.	0	0	19	0	0	0	0	0	0	0	19
Firewood—cords	6 027	12 000	9 685	2 953	8 175	800	100	897	749	100	41 487
Wood chips BDUC	0	6 223	3 935	0	0	0	0	0	0	0	10 158
Preserved plywood (1/16-in. basis) —M sq. ft.	200	0	0	0	0	0	0	0	0	0	200
Insulation and fiberboard sheathing (1/2-in. basis)—MM sq. ft.	20	0	0	0	0	0	0	0	0	0	20
Pulp (kraft sulfate)—tons	0	0	0	0	0	7 281	0	0	0	0	7 281
Paper (kraft sulfate)—tons	0	0	0	0	0	138 338	0	0	0	0	138 338
Newsprint—tons	0	175 905	0	0	0	0	0	0	0	0	175 905
Paper and roofing products —tons	50 000	0	0	0	0	0	0	0	0	0	50 000

^a Sources: NoFRC Forest Industry Survey, 1980.^b Includes siding, moldings, paneling, and furniture stock.^c BDU - Bone dry units (1 BDU = 2400 lb.).

Table 44. Engineered capacity, normal output, and operating ratios by forest industry group, 1979-80

Industry group	Average ^a engineered capacity (per 8-hr. shift)		Average ^a normal output (per 8-hr. shift)		Operating ratio	
	Sawmill (fbm)	Planer (fbm)	Sawmill (fbm)	Planer (fbm)	Sawmill	Planer
Sawmills						
5 MM fbm and over	73 750	87 000	56 250	68 250	0.76	0.78
1 MM to 5 MM fbm	20 000	31 722	13 879	23 426	0.69	0.74
100 M to 1 MM fbm	9 821	15 000	6 911	11 000	0.70	0.73
Less than 100 M fbm	5 050	IR	IR	IR	IR	IR
Independent planing mills	b	IR	b	IR	b	
Wood preservation	3 100	cu. ft.	1 800	cu. ft.		0.58
Miscellaneous		IR		IR		IR
Pulp, paper, and fiberboard						
Pulp and paper mills	492	tons/day	427	tons/day		0.88
Building products	100	tons/day	90	tons/day		0.90
Fiberboard (1/2-in. basis)	37 000	sq. ft.	37 000	sq. ft.		1.00

^a Averages are weighted by mill output.

^b Not applicable.

IR Insufficient response.

for this is that the sawmill manager can simply shut down the planer until he has enough lumber stockpiled that a shortage of inputs does not prevent the machinery from reaching higher levels of capacity utilization. Although operating rates were generally higher on a per-shift basis for the planing mill part of the complex, the number of shifts in operation was generally lower than with the sawmill equipment.

An additional approach to analyz-

ing capacity in Manitoba's forest industry is to indicate factors constraining expansion of the capital stock and consequently process capacity. Constraining factors limiting the expansion of existing forest industry firms are shown in Table 45. The primary constraints for firms in all forest industry groups were lack of available timber and soft market demand. Shortage of labour was indicated to be of secondary importance for two sawmills in the medium sawmill class.

Table 45. Factors limiting the operation and expansion of Manitoba's forest industries, 1979-80

Industry	No. of firms	Factor ratings ^a	Limiting factors							% of firms reporting factors
			Availability of timber	Labor shortage	Log yard stability	Logging access in summer	Dry kiln capacity	Escalating labor and energy costs	Market demands	
Sawmills										
5 MM fbm and over	5	1	2	0	1	0	0	0	2	100
1 MM to 5 MM fbm	19	2	1	0	0	0	0	0	1	40
		1	6	0	0	0	0	0	4	53
		2	0	2	0	0	0	0	1	11
		3	0	0	0	0	0	0	1	5
Independent planing mills	5	1	1	0	0	0	0	0	1	40
		2	0	0	0	0	0	0	1	20
Wood preservation plants	2	1	1	0	0	0	0	0	0	50
		2	0	0	0	0	0	0	1	50
Pulp, paper, and fiberboard	3	1	0	0	0	0	0	0	3	75
		2	0	0	0	1	0	1	0	50

^a Indicates the order of importance of factors limiting the operation and expansion of the forest industry, with decreasing importance from 1 to 3.

Production Of The Sawmill And Planing Mill Industry Groups

The 181 sawmills and planing mills operating in 1979-80 produced 151 148 M fbm of lumber, of which 101 276 M fbm (67%) was planed (Table 46). Dimension lumber²⁰ represented the principal product of this industry group, accounting for 81% of all lumber products. Board products and timbers represented 11.9% and 7.1%, respectively, of all sawmill products.

Large sawmills produced over half of the total lumber production while medium sawmills produced 21%. The balance was manufactured by small firms.

Among dimension lumber products, 2 X 4s predominated, accounting for 57.1% of all dimension lumber produced, while 2 X 6s, 2 X 8s, and 2 X 10s accounted for 27.8%, 8.5%, and 4.6%, respectively (Table 47). Among board lumber products, 1 X 6s and 1 X 4s accounted for 45.7% and 30.1% of all products, respectively.

Jack pine was the major species used by the Manitoba sawmill industry (Table 48). Almost half of the dimension lumber, 26% of boards, and about 41% of timber products were cut from pine. Spruce was the second most important softwood lumber species. Deciduous species were the source of 17.9% of lumber products.

Except for large sawmills where rail transportation prevailed, lumber transportation was generally by truck (Table 49). The large sawmills moved about 56% of their total lumber production by rail and

approximately 44% by truck. Two factors are important for explaining the differences in transportation mode. First, large sawmills usually have a sufficient quantity of lumber to fill rail cars on a continuous basis. Second, a large portion of lumber products from large mills are moved long distances to export markets in the United States. Rail transportation is less expensive than truck for long hauls and, as a result, rail transport was the preferred mode.

Wood Preservation Industry Group

This industry group represented a relatively minor part of the Manitoba forest industry. Both of the firms operating used pressure-preserving equipment as opposed to open-tank dippers. The industry produced 726 M cu. ft. of posts and poles, 200 M sq. ft. of treated plywood, and 685 M cu. ft. of lumber in 1979-80 (Table 50). The majority of treated products were marketed in Manitoba. Pressure-preserved poles were used principally by provincial telephone and hydro utility companies, while fence posts were in high demand in rural areas.

Pulp, Paper, And Fiberboard Industry Group

With 74% of gross sales, this industry group was by far the largest in the Manitoba forest industry in 1979-80. Products included kraft pulp, paper, newsprint, and fiberboard (Table 51). Newsprint was the major pulp and paper product representing 47% of the total tonnage produced in Manitoba.

²⁰ Timbers, dimension lumber, and board lumber refer to sawn material of thicknesses of 3 in. or greater, 2 in., and 1 in., respectively. The material can be of any length or width.

Table 46. Manitoba lumber production by size class and quality class, 1979-80

Lumber type	Industry group				Independent planing mills	Total
	Sawmills					
	5 MM fbm and over	1 MM to 5 MM fbm	100 M to 1 MM fbm	less than 100 M fbm		
Dimension lumber ^a						
Planed	70 461	7 867	2 083	236	10 622	91 269
Rough	7 164	13 660	6 925	2 063	1 274	31 086
Total	77 625	21 527	9 008	2 299	11 896	122 355
Board lumber ^b						
Planed	4 949	1 847	556	56	2 043	9 451
Rough	2 741	2 271	1 252	479	1 726	8 469
Total	7 690	4 118	1 808	535	3 769	17 920
Timbers ^c						
Planed	0	3	3	0	550	556
Rough	0	6 433	3 691	93	100	10 317
Total	0	6 436	3 694	93	650	10 873
Total planed	75 410	9 717	2 642	292	13 215	101 276
Total rough	9 905	22 364	11 868	2 635	3 100	49 872
Total production	85 315	32 081	14 510	2 927	16 315	151 148

^a Material of 2-in. thickness.^b Material of 1-in. thickness.^c Material of 3-in. or over thickness.

Table 47. Detailed product description of Manitoba lumber output, 1979-80

Lumber product	Size (in.)	Planed (M fbm)	Rough (M fbm)	% by size	% of all products
Dimension	2 X 2	0	72	0.1	0.0
	2 X 3	794	0	0.6	0.5
	2 X 4	61 935	8 008	57.1	46.4
	2 X 5	0	640	0.5	0.4
	2 X 6	20 253	13 756	27.8	22.5
	2 X 8	4 034	6 332	8.5	6.8
	2 X 10	3 404	2 160	4.6	0.6
	2 X 12	849	118	0.8	0.6
Total		91 269	31 086	100.0	80.9
Boards	1 3/4 X 1 3/4	0	287	1.6	0.2
	1 X 3	162	1	0.9	0.1
	1 X 4	3 418	1 986	30.1	3.6
	1 X 5	1 457	258	9.6	1.1
	1 X 6	4 133	4 054	45.7	5.4
	1 X 7	0	0	0.0	0.0
	1 X 8	235	1 567	10.1	1.2
	1 X 10	46	37	0.5	0.1
	1 X 12	0	279	1.5	0.2
Total		9 451	8 469	100.0	11.9
Timbers	3 X 3	0	3	0.0	0.0
	3 X 4	0	946	8.7	0.6
	3 X 6	0	183	1.7	0.1
	3 X 8	0	732	6.7	0.5
	4 X 4	556	3 722	39.4	2.8
	4 X 5	0	162	1.5	0.1
	4 X 6	0	3 089	28.4	2.1
	6 X 6	0	1 402	12.9	0.9
	8 X 8	0	78	0.7	0.1
Total		556	10 317	100.0	7.2

Table 4.8. Species mix of lumber production, 1979-80

Mill size	Product	Total production (M fbm)	Species									
			Spruce		Pine		Balsam fir		Other coniferous ^a		Deciduous ^b	
			(M fbm)	(%)	(M fbm)	(%)	(M fbm)	(%)	(M fbm)	(%)	(M fbm)	(%)
Sawmills 5 MM fbm and over	Dimension Boards	77 625	26 703	34.1	62 694	55.0	2 950	3.8	0	0.0	5 278	6.8
	Timbers	7 690	2 292	29.8	1 169	15.2	0	0.0	0	0.0	6 229	55.0
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
1 MM to 5 MM fbm	Dimension Boards	21 527	8 417	39.1	7 707	35.5	0	0.0	0	0.0	5 403	25.1
	Timbers	6 118	1 190	28.9	1 705	41.4	0	0.0	0	0.0	1 223	29.7
		6 436	346	6.0	3 334	51.8	0	0.0	0	0.0	2 716	62.2
100 M to 1 MM fbm	Dimension Boards	9 008	3 225	35.8	1 324	14.7	0	0.0	171	1.9	4 288	47.6
	Timbers	1 808	785	43.4	325	18.0	0	0.0	0	0.0	698	38.6
		3 694	1 016	27.5	857	23.2	0	0.0	0	0.0	1 821	49.3
Less than 100 M fbm	Dimension Boards	2 299	1 127	49.0	276	12.0	62	2.7	34	1.5	800	34.8
	Timbers	535	232	43.3	87	16.3	12	2.3	8	1.5	196	36.6
		93	5	5.7	19	20.2	2	2.2	11	11.5	36	60.6
Independent planing mills	Dimension Boards	11 896	6 305	53.0	5 163	43.4	0	0.0	83	0.7	343	2.9
	Timbers	3 769	1 700	45.1	1 383	36.7	0	0.0	128	3.6	538	14.8
		93	5	5.7	19	20.2	2	2.2	11	11.5	56	60.6
Total sawmills and planing mills	Dimension Boards	122 355	45 761	37.4	57 140	46.7	3 059	2.5	245	0.2	16 150	13.2
	Timbers	17 920	6 182	34.5	4 659	26.0	18	0.1	143	0.8	6 918	38.6
		10 873	1 707	15.7	6 858	41.0	11	0.1	11	0.1	6 686	43.1
Total		151 148	53 650	35.5	66 257	43.8	3 088	2.0	399	0.3	27 734	18.4

^a Includes tamarack and eastern white cedar.^b Includes mostly aspen and lesser amounts of other species such as balsam poplar, ash, and elm.

Table 49. Transportation of lumber products, 1979-80

Mill size	Product	Total production (M fbm)	Method of transportation			
			Truck (M fbm)	(%)	Rail (M fbm) (%)	
Sawmills 5 MM fbm and over	Dimension Boards	77 625	30 351	39.1	47 274	60.9
	Timber	7 690	7 121	92.6	569	7.4
		0	0	0.0	0	0.0
1 MM to 5 MM fbm	Dimension Boards	21 527	21 419	99.5	108	0.5
	Timber	4 118	4 106	99.7	12	0.3
		6 436	6 436	100.0	0	0.0
100 M to 1 MM fbm	Dimension Boards	9 008	9 008	100.0	0	0.0
	Timber	1 808	1 808	100.0	0	0.0
		3 694	3 694	100.0	0	0.0
Less than 100 M fbm	Dimension Boards	2 299	2 299	100.0	0	0.0
	Timber	535	535	100.0	0	0.0
		93	93	100.0	0	0.0
Independent planing mills	Dimension Boards	11 896	11 896	100.0	0	0.0
	Timber	3 769	3 769	100.0	0	0.0
		650	650	100.0	0	0.0
Total sawmills and planing mills	Dimension Boards	122 355	74 973	61.3	47 382	38.7
	Timber	17 920	17 339	96.8	581	3.2
		10 873	10 873	100.0	0	0.0
Total		151 148	103 185	68.3	47 963	31.7

Table 50. Production of the wood preservation industry group, 1979-80

Product type	Total production	Units	Own production	Custom preserving
Preserved lumber	685 143	cu. ft.	669 169	15 974
Posts	555 591	cu. ft.	555 591	0
Poles	170 783	cu. ft.	130 847	39 936
Plywood (based on 1/16-in. thick- ness)	200	M. sq. ft.	200	0

Table 51. Production of the pulp, paper, and fiberboard industry group, 1979-80

Product type	Quantity
Newsprint	175 905 tons
Kraft paper (brown)	138 338 tons
Kraft pulp (unbleached)	7 281 tons
Roofing felt	37 500 tons
Asphalt shingles	7 500 tons
Asphalt felt	2 500 tons
Rolled roofing	2 500 tons
Insulation board and fiberboard	20 000 M sq.ft. ^a

^a 1/2-in. basis.

CHAPTER VII

MARKETS FOR MANITOBA'S FOREST PRODUCTS

The products of Manitoba's forest industry were sold on local, provincial, national, and foreign markets in 1979-80. The major portion of Manitoba's forest industry output was sold in neighboring provinces or foreign markets. A portion of some forest products, particularly lumber and miscellaneous products was retained by smaller businesses for their own use. A more significant quantity of these products was sold on local markets. For the purposes of this report, a local market has been defined as an area within a 50-mile radius of the location of the manufacturing firm.

Lumber Markets

Large sawmills exported 53.8% of their dimension and 36.1% of their board products to U. S. markets (Table 52). Almost 21% of dimension products and 19% of boards were marketed in Saskatchewan and Alberta. The remaining 25% of dimension stock and 45% of board products were sold on provincial markets. Because of limited supply and high demand within Manitoba, all timbers produced by large sawmills were marketed within the province.

Of the dimension lumber produced by large mills, 46.9% was shipped by rail to markets in the midwestern states. The majority of board production sold in the U.S. was also transported by rail. Truck transport to the U.S. accounted for only 6.9% of the total dimension production of large mills. Truck transport was a more important mode of transport for lumber exports to Saskatchewan and Alberta.

Medium sawmills exported only small amounts of dimension lumber to the U.S. and Saskatchewan. Forty-five percent of the board production and 9.4% of the timbers produced by this category

of mills were exported to the U.S. The majority of the production from this sawmill class was consumed in Manitoba.

Small sawmills producing 100 M to 1 MM fbm annually produced dimension lumber, boards, and timbers principally for local and provincial markets. Minor quantities of these products were either exported or retained by owner-operators for their own use. Local housing and light-industry construction were the major uses for the output of these sawmills.

Over 85% of the dimension and board lumber from small mills producing less than 100 M fbm annually was sold on local markets or kept for the private use of the producer. Only small quantities were marketed more than 50 miles from the point of manufacturing. Nearly all the lumber produced was used by local construction contractors or by the mill operators for home construction and repair. Timbers were used entirely for local or producer consumption. All the production of this sawmill category was transported by truck.

Independent planing mills sold their production in approximately equal proportions on export and provincial markets. The miscellaneous wood-using industry group manufactured some lumber and sold it on local and provincial markets also. Some independent log producers had their logs cut by sawmills into various lumber products on a contract basis. The majority of the dimension stock of these producers was sold on the provincial market. Most of the board production was sold on local markets.

Markets For Preserved Wood Products

Approximately three-quarters of

Table 52. Markets for lumber products, 1979-80

Mill size	Product	Total production (M fbm)	Destination of products						
			Own Use (M fbm)	Local (M fbm)	Manitoba (M fbm)	Saskatchewan (M fbm)	Alberta (M fbm)	Midwest ^a U.S.A. (M fbm)	(%)
			(%)	(%)	(%)	(%)	(%)	(%)	(%)
Sawmills	5 MM fbm and over	77 625 ^b	0	0	19 717	11 178	4 968	41 762	53.8
		7 690	0	0	3 460	1 453	0	2 776	36.1
1 MM fbm to 5 MM fbm	Dimension Boards	21 527	21	2 260	17 953	108	0	1 184	5.5
		4 118	0	354	1 911	16	0	1 837	44.6
100 M fbm to 1 MM fbm	Timbers	6 436	19	3 199	5 612	0	0	605	9.4
		9 008	757	3 279	4 828	9	0	135	1.5
Less than 100 M fbm	Dimension Boards	1 808	92	792	871	7	0	45	2.5
		3 694	0	432	2 582	0	0	680	18.4
Independent planing mills	Timbers	2 259	793	1 189	317	0	0	0	0.0
		535	227	250	58	0	0	0	0.0
Miscellaneous mills	Dimension Boards	11 896	0	0	6 352	0	0	5 543	46.6
		3 769	0	200	2 235	0	0	1 334	35.4
Log producers	Timbers	650	0	100	275	0	0	275	42.3
		400	0	90	310	0	0	0	0.0
Total	Dimension Boards	124 159	1 614	7 155	50 500	11 295	4 968	48 624	40.1
		18 439	324	2 014	8 631	1 476	0	5 992	32.7
Total	Timbers	10 895	54	811	8 469	0	0	1 560	14.2

^a Includes Illinois, Minnesota, Indiana, North Dakota, South Dakota, Iowa, Nebraska, and Wisconsin.^b Numbers may not add exactly to totals due to rounding.

the production of preserved posts and poles was sold on provincial markets, mostly for use by farmers or by hydro and utility companies (Table 53). About one-fifth of the total production was exported to Saskatchewan and a minor quantity was sold in the U.S. The bulk of preserved lumber (85.4%) was sold in Manitoba, with minor quantities exported to Saskatchewan and the U.S. A similar distribution pattern was observed for preserved plywood.

Markets For Pulp, Paper, And Fiberboard Products

The United States was a major consumer of these products, importing 32% of Manitoba's newsprint, pulp, and paper production and 57% of the province's insulation board and fiberboard production (Table 54). Eighteen percent of the newsprint, pulp, and paper and 15% of the fiberboard and insulation board were sold on local and provincial markets. The balance of these products was sold in Canada, mainly in the other western provinces.

Table 53. Markets for preserved wood, 1979-80

Market	Preserved posts		Preserved poles		Preserved lumber and timber		Preserved plywood	
	(cu.ft.)	(%)	(cu.ft.)	(%)	(cu.ft.)	(%)	(sq. ft.) ^a	(%)
Local	0	0.0	0	0.0	15 758	2.3	2 200	1.1
Manitoba	423 360	76.2	131 161	76.8	569 354	83.1	159 200	79.6
Saskatchewan	117 230	21.1	34 840	20.4	71 940	10.5	31 800	15.9
Ontario-Quebec	0	0.0	0	0.0	0	0.0	0	0.0
Total for Canada	540 590	97.3	166 001	97.2	657 052	95.9	193 200	96.6
Midwestern United States ^b	15 001	2.7	4 782	2.8	28 091	4.1	6 800	3.4
Total production	555 591	100.0	170 783	100.0	685 143	100.0	200 000	100.0

^a 1/16-in. basis.^b Includes Illinois, Minnesota, Indiana, North Dakota, South Dakota, Iowa, Nebraska, and Wyoming.

Table 54. Markets for pulp, paper, and fiberboard industry group products, 1979-80

Market	Newsprint		Paper and roofing products		Unbleached kraft pulp & paper		Insulation board and fiberboard sheathing	
	(Tons)	(%)	(Tons)	(%)	(Tons)	(%)	(M sq.ft.) ^a	(%)
Manitoba	35 180	20.0	18 000	36.0	14 561	10.0	2 955	15.0
Saskatchewan	26 386	15.0	15 500	31.0	14 562	10.0	2 365	12.0
Ontario	0	0.0	0	0.0	29 124	20.0	0	0.0
Rest of Canada	26 386	15.0	14 000	28.0	58 248	40.0	3 280	16.0
Total Canada	87 952	50.0	47 500	95.0	116 495	80.0	8 600	43.0
United States	87 953	50.0	2 500	5.0	29 124	20.0	11 400	57.0
Total	175 905	100.0	50 000	100.0	145 619	100.0	20 000	100.0

^a 1/2-in. basis.

CHAPTER VIII

ANNUAL REVENUES AND EXPENDITURES IN THE FOREST INDUSTRY

This chapter describes expenditures incurred and revenues received by the forest industry of Manitoba in 1979-80 (Table 55). Expenditures have been divided into operating and capital categories. The operating expenditure category includes the total variable and fixed costs of production. Capital expenditures are those costs incurred by firms in replacing used infrastructure and equipment, upgrading obsolete infrastructure and equipment, expanding the productive capacity of existing infrastructure and equipment, and for constructing new production units.

Operating Expenditures By Industry Group

Sawmill industry group

With 17% of total industry sales (\$34 180 076), this industry group is the second-largest in the Manitoba forest industry (Table 55). The largest expenditure in the group was for wages and salaries, which equalled 41% of total revenue. Contractor fees were the second-largest direct expenditure item, equalling 16% of sales. Three percent of total revenue was spent on fuel and electricity.

Independent planing mill industry group

Sales in this group were valued at \$4 055 470, representing 2% of total forest industry sales. The dominant expenditure was for wood inputs, with purchases equalling 60% of sales. Purchased wood inputs for the industry included rough-sawn lumber obtained from the sawmill industry. Wages and salaries and energy expenditures equalled 9% and 2% of sales, respectively.

Wood preservation and miscellaneous industry groups

Sales in these groups totaled \$11 964 701, or 6%, of total forest industry sales. In these groups, 19% and 3% of total sales were expended on wages and salaries and energy, respectively. These industry groups had the second-lowest labor cost of the four categories.

Pulp, paper, and fiberboard industry group

The four mills in this group accounted for 75% of total sales of the forest industry in Manitoba (\$146 964 000). Expenditures on wages and salaries reached over \$31 million (21% of sales) and accounted for 61% of the wages and salaries paid by the entire forest industry.

The second major expenditure in this group was the acquisition of materials and supplies. Expenditures on a wide range of materials, such as caustic sodas, chlorine, and sodium chlorate, amounted to \$22 million. On both an absolute and a relative basis, this industry group spent more than any other industry group on energy. The \$20 million spent amounted to 93% of the fuel and electricity bill for the entire forest industry.

Annual Capital Expenditures

As opposed to operating expenditures, which are costs of production, capital expenditures are revenue-generating investments that are intended either to create profits (for private enterprises) or to achieve a desired social objective (for publicly owned enterprises). The total capital outlay by the Manitoba forest industry in

Table 55. Revenues and operating expenditures for sawmill, independent planing mill, pulp, paper, and fiberboard, and wood preservation and miscellaneous industry groups, 1979-80

	Sawmills		Independent planing mills		Pulp, paper and fiberboard		Wood preservation and miscellaneous	
	\$	%	\$	%	\$	%	\$	%
Value of sales (f.o.b. mill)	34 180 076		4 055 470		146 964 000		11 964 701	
Fuel and electricity	948 157	2.8	62 389	1.5	20 156 000	13.7	305 433	2.5
Materials and supplies	288 954	0.8	3 500	0.1	22 214 288	15.1		
Maintenance and repair	2 312 425	6.8	79 200	1.9	8 447 190	5.7		
Wood inputs (purchased) roundwood or semiprocessed	1 734 159	5.1	2 438 000	60.1	18 561 685	12.6	6 394 060 ^a	53.4
Payments to contractors	5 429 258	15.9	0	0.0	4 422 000	3.0		
Payments to provincial government (stumpage, etc.)	499 738	1.5	0	0.0	618 118	0.4		
Wages and salaries	13 963 315	40.8	374 000	9.2	31 249 561	21.3	2 241 656	18.7
General and administration	1 691 064	4.9	81 724	2.0	4 101 000	2.8		
Others ^b	7 313 006	21.4	1 016 657	25.1	37 194 158	25.3	3 023 552	25.3

^a Includes general and administration expenditures.

^b Includes depreciation, municipal taxes, operating costs for roads, and other unallocated residuals and profits.

1979-80 was around \$13.4 million. These funds included expenditures for construction and for purchases of machinery and equipment in both plant and woodlands operations. The distribution of capital expenditures into the various categories by industry group is shown in Table 56.

Cost Of Wood Inputs

In the primary wood-using industry survey, no attempt was made to differentiate expenditures incurred in procuring wood from expenditures incurred in the final processing of wood. Many of the firms could not provide information on the exact proportion of particular types of costs (e.g., wages and salaries, fuel and electricity, and materials and supplies) expended in either woodlands or processing operations. As a result, the expenditures shown in the first section of this chapter and in Table 55 include both wood procurement and processing costs. The firms did, however, indicate average per-unit cost of fiber inputs (an average of all costs incurred in harvesting and transporting the wood from the forest to the mill on a per-unit input basis).

In relation to other specific costs (for example, wages and salaries, fuel and electricity, and materials and supplies), the cost of roundwood supplied to the mill represented the greatest single cost of production.²¹ The importance of wood costs in the total cost of manufacturing forest products is emphasized in the review of the Canadian Forest Products Industry published by the federal Department of Industry, Trade and Commerce (1979). The review notes the following at page 167:

Wood represents the largest

single cost component in the manufacture of lumber, newsprint, and other primary products and therefore is a principal factor determining a manufacturer's competitive position in world markets. The fact that there appears to be less regional variation in the aggregate of all other manufacturing costs for plants of similar scale and vintage further illustrates the importance of competitive wood costs.

To illustrate the extent and variation in wood fiber costs in Manitoba, information is provided for the sawmill industry group by category (Table 57 and Figure 13). The weighted average cost of delivered roundwood was \$43 per cunit. Based on the proportion of final per-unit product value spent on harvesting and delivering wood to the mill gate, wood costs accounted for 33% of final sales.

Observation of wood costs for the sawmill industry group cross-sectionally shows a trend toward decreasing unit wood costs with smaller mills. Input costs in the largest mills averaged \$46 per cunit, while in the smallest mills the average cost dropped to \$24 per cunit. This trend might be explained by a lower average haul for small mills in comparison to large mills. For small mills producing less than 100 M fbm annually, the average haul was 17 miles. The weighted average haul increases in the larger mill classes and is 32 miles for large mills. The breakdown of wood costs into harvesting and transportation is shown in Figure 13. The graph shows that the majority of the savings in wood input costs in smaller sawmill classes occurred from reduced transportation costs on a per-unit basis.

²¹ This fact has been recognized in a number of studies including F.L.C. Reed and Associates Ltd. (1973), Teskey and Smyth (1975a), Sandwell Management Consultants Ltd. (1977), and the Ontario Ministry of Natural Resources (1981).

Table 56. Capital expenditures by industry group 1979-80

Type of capital expenditure	Sawmills ^a		Independent planing mills		Pulp, paper, and fiberboard		Miscellaneous and wood preservation	
	\$	% of total expenditure	\$	% of total expenditure	\$	% of total expenditure	\$	% of total expenditure
Plant construction	75 074	6.6	60 000	74.5	IR	-	120 341	23.6
Plant machinery and equipment	361 777	31.8	20 500	25.5	IR	-	389 829	76.4
Woodlands construction ^b	148 905	13.1	0	0.0	IR	-	0	0.0
Woodlands machinery and equipment	553 379	48.6	0	0.0	IR	-	0	0.0
Total	1 139 135	100.0	80 500	100.0	11 669 000	-	510 170	100.0

^a Not including sawmills producing less than 100 M fbm per year.

^b Construction of logging roads and bridges.

IR Insufficient response.

Table 57. Wood input costs as a proportion of final product value by sawmill size, 1979-80

Annual production	Weighted average wood input cost		Weighted average one-way haul (miles)	Weighted average wood input cost (\$ per M fbm)	Weighted average product value (\$ per M fbm)	% of per unit product value spent on wood input
	\$ per cunit ^a	Range of \$ per cunit				
5 MM fbm and over ^b	46	30 - 65	32	76	233	33
1 MM to 5 MM fbm ^c	39	18 - 71	35	64	197	32
100 M to 1 MM fbm ^d	27	10 - 65	12	44	191	23
Less than 100 M fbm ^e	24	14 - 36	17	39	185	21
Total all sawmills	43	10 - 71	32	70	214	33

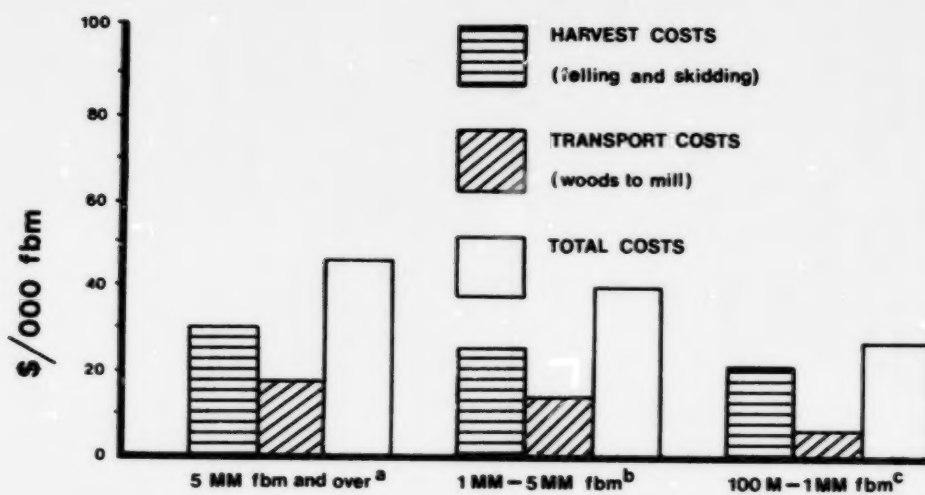
^a 1 cunit = 100 cu. ft. of roundwood.

^b Three out of 5 mills responding.

^c Ten out of 19 mills responding.

^d Twenty-one out of 43 mills responding.

^e Five out of 109 mills responding.



^a Three out of five mills responding

^b Eight out of nine mills responding

^c Fourteen out of forty-three mills responding

Figure 13. Wood cost components by sawmill size, 1979-80.

CHAPTER IX

THE SOCIOECONOMIC IMPACT OF THE FOREST INDUSTRY IN MANITOBA

No single criterion exists that can adequately measure the socioeconomic contribution of a particular industry to a regional, provincial, or national economy. In this report the economic contribution of the Manitoba forest industry has been assessed using information on employment, wages and salaries, value added, value of provincial exports, and community stability.

Employment And Wages And Salaries

Descriptive measures of employment associated with Manitoba's forest industry were discussed in Chapter V. In this section the economic impact of the forest industry is discussed by relating employment data from the forest industry (including proportion of product value spent on wages and salaries, total number employed, total wages and salaries paid, and average income per employee) to corresponding data from other manufacturing industries in the Manitoba economy.²²

The total employed labor force in Manitoba in 1979 was 453 000 persons (Manitoba Bureau of Statistics 1980). Approximately 56 461 persons (12% of total employment) were employed in the manufacturing sector. The forest industry (primary wood-using) accounted for 2.8% of the employment and 3.6% of total wages and salaries paid for all industries within the manufacturing sector (Table 58). Within the sector, the forest industry ranked first in average income per employee, tenth in total number employed, and tenth in total wages and salaries paid.

Total person-years of employment (including company and contract employment), total wages and salaries paid (including company and contract employment), and average income per employee for each of Manitoba's forest industry groups are shown in Table 59. The pulp, paper, and fiberboard group provided the most jobs and showed the highest income per employee.

The percentage of the total value of shipments of manufactured goods expended on wages and salaries among different industry groups in Manitoba's manufacturing sector is shown in Table 60. The forest industry is labor-intensive relative to other industries. Wages and salaries equalled approximately 27% of the total value of shipments, compared to 20% in the manufacturing sector as a whole.

The proportion of final sales expended on wages and salaries for each of Manitoba's primary forest industry groups is shown in Table 61. The sawmill industry group expends the greatest proportion of sales on wages and salaries while the pulp, paper, and fiberboard group spent only 21% of total sales value on wages and salaries. Wages and salaries were the greatest single expenditure in both the pulp, paper, and fiberboard and sawmill industry groups (Table 55).

Value Added

Value added is defined by Bannock et al. (1978) as follows:

²² Different data sources have produced a large difference in the measures of wages and salaries, employment, and value added shown in Tables 58, 60, and 62 and the measures for these categories provided throughout the rest of this report. The values shown in Tables 58, 60, and 62 are based on Statistics Canada data. All other data have been derived from the NoFRC primary wood-using industry survey.

Table 58. Employment, earnings, and average income per employee by industry category in the manufacturing sector, 1979^a

Industry category	Total annual wages and salaries paid		Rank	Total employed		Rank	Average annual income per employee		Rank
	\$000	% of total manufacturing		No.	% of total manufacturing		\$		
Food and beverage	138 454	19.9	1	10 700	19.0	1	14 809		7
Rubber and plastic products	9 349	1.2	13	725	1.3	14	12 895		11
Leather	6 383	0.8	15	521	0.9	15	12 251		13
Textiles	8 683	1.1	14	854	1.5	13	10 167		14
Knitting	5 155	0.7	16	471	0.8	16	10 945		15
Clothing	68 203	8.5	5	6 852	12.1	3	9 945		16
Primary wood-using ^b	28 610	3.6	10	1 579	2.8	10	18 119		1
Secondary and tertiary wood-using	130 583	16.4	2	9 543	16.9	2	13 684		10
Primary metal	43 987	5.5	7	2 608	4.6	7	16 866		3
Metal fabricating	79 658	10.0	4	5 085	9.0	5	15 665		5
Machinery	65 886	8.3	6	4 524	8.0	6	14 564		8
Transportation equipment	90 606	11.4	3	6 560	11.6	4	13 812		9
Electrical products	34 225	4.3	8	2 265	4.0	8	15 110		6
Nonmetallic mineral products	29 365	3.7	9	1 624	2.9	9	18 082		2
Chemical and chemical products	16 494	2.1	11	1 025	1.8	12	16 092		4
Miscellaneous manufacturing	16 302	2.0	12	1 325	2.4	11	12 303		12
Petroleum and coal products	X	X	X	X	X	X	X		X
Residual	X	X	X	X	X	X	X		X
Total manufacturing	798 346	100.0		56 461	100.0		14 140		

^a Source: Statistics Canada 1982a.^b Includes sawmills, planing mills, wood preservation, miscellaneous, and pulp, paper, and fiberboard mills.^c Includes furniture manufacturing, wooden boxes, kitchen cabinets, etc.

X Confidential.

Table 59. Employment, earnings, and average income per employee by forest industry group, 1979

Industry group	Total own employment (person-years)	Total wages and salaries (\$)	Average income per employee (\$/person-year)	Contract employment (person-years)	Estimated wages and salaries to contract employees (\$)	Total estimated wages and salaries paid to contract and own employees (\$)
Sawmills	768	13 963 315	18 181	257	4 672 517	18 635 832
Independent planing mills	33	374 000	11 333	1	11 333	385 333
Miscellaneous ^a	218	2 241 656	10 283	8	82 264	2 323 920
Pulp, paper, and fiberboard	1 274	31 249 561	24 529	221	5 420 909	36 670 470
Total	2 293 ^b	47 828 532	20 858	487	10 187 023	58 015 555

^a Includes lath mill, pallet plants, and building timber plants.^b Does not include independent log producers.

Table 60. Sales in relation to wages and salaries in the manufacturing sector, by industry category, 1979^a

Industry	Value of shipments of goods of own manufacturing (\$000)	Wages and salaries (\$000)	% of sales spent on wages and salaries
Agricultural processing	1 291 120	164 837	12.8
Petrochemical ^b	137 234	25 843	18.8
Metals and equipment	1 242 677	314 362	25.3
Forest products ^{c,d}	592 475	159 193	26.9
Nonmetallic mineral products	136 173	29 365	21.6
Miscellaneous and residual industries	515 041	104 746	20.3
Total	3 914 720	798 346	20.4

^a Source: Statistics Canada 1982a.

^b Petroleum and coal products industry is confidential and has been included in the residual category.

^c See Appendix 4 for industries included in this category.

^d Pulp and paper mills and asphalt roofing manufacturing values have been estimated.

Table 61. Percent of sales spent on wages and salaries by forest industry group, 1979-80

Industry group	% of sales spent on wages and salaries
Sawmills	40.8
Independent planing mills	9.2
Wood preservation and miscellaneous mills	18.7
Pulp, paper, and fiberboard	21.3

The difference between the total revenue of a firm and the cost of bought-in raw materials, services, and components. It thus measures the value which the firm has 'added' to these bought-in materials and components by its processes of production.

The value added generated by a particular industry is a measure of that industry's contribution to total provincial income (measured by gross provincial product) and is thus a valuable parameter for assessing the economic contribution of the forest industry. Value-added measures have two additional attributes. First, they avoid double counting of production. Second, they can be meaningfully related to levels of input use (labor and capital) employed by the industry (Statistics Canada 1979).

Manitoba's gross provincial product (G.P.P.) in 1979 was \$10 337 million, of which the goods-producing sector accounted for 37% (Figure 14). The manufacturing sector represented 41% of the goods producing sector and 15% of the G.P.P. The forest products industries, including primary, secondary, and tertiary wood users, accounted for 18% of the total value added created by all manufacturing industries in the Manitoba economy. The industries covered in this study (primary wood-using) accounted for 25% of the total forest products group and 5% of the manufacturing sector.

Total value added and value added per person-year in the forest industry and other groups in the manufacturing sector are shown in Table 62. The primary wood-using group ranked tenth in total value added and fourth in value added per person-year. Total value added and value added per person-year is shown for each of the industry groups within the primary wood-using industry class in Table 63. The pulp, paper, and fiberboard industry group ranked first in both total value

added and value added per employee, contributing \$68 444 000 in total value added and \$53 724 on a per person-year basis. The sawmill industry group ranked second in total value added (\$21 276 000), and third in value added per person-year (\$27 703). The pulp, paper, and fiberboard and sawmill industry groups accounted for 93% of total primary wood-using industry value added.

Regional Economic Base Analysis

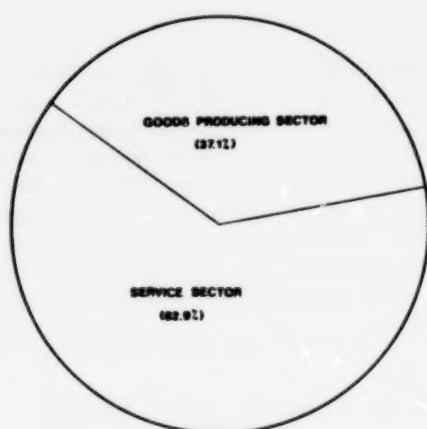
The fundamental premise of regional base theory is described by Stewart (1978) as follows:

Most communities are unable to produce all the goods and services they require so purchases are necessary from beyond. Economic activities which produce the external income to pay for needed imports are 'basic' or export activities while supporting activities are 'non-basic' or service activities. The theory holds that a regional economy within a developed national economy, and the latter also, must produce and export goods and services to survive and prosper.

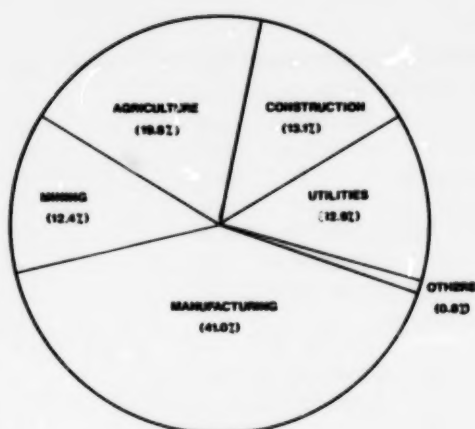
Thus each of the forest industry groups in Manitoba is considered to be 'basic'. For the combined forest industry, \$116 101 560, or 71% of the total value of production of the forest industry, is exported out of the province. This income contributes significantly to the health of the Manitoba economy.

The Economic Stability Of Manitoba's Rural Communities

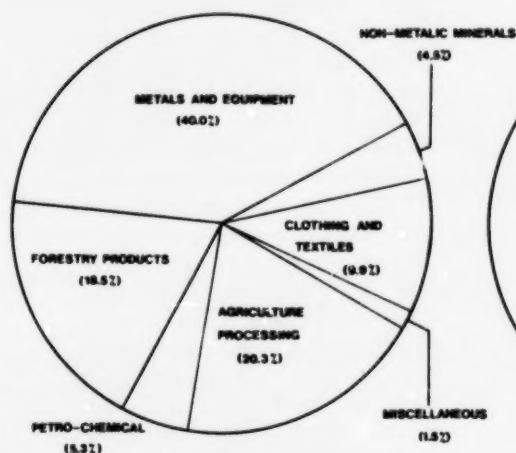
The community stability concept is the primary rationale for two important



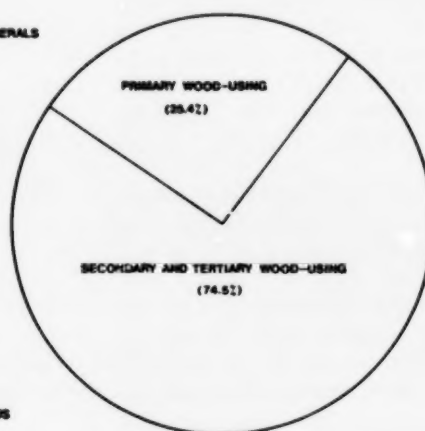
MANITOBA GROSS DOMESTIC
PRODUCT - 1979



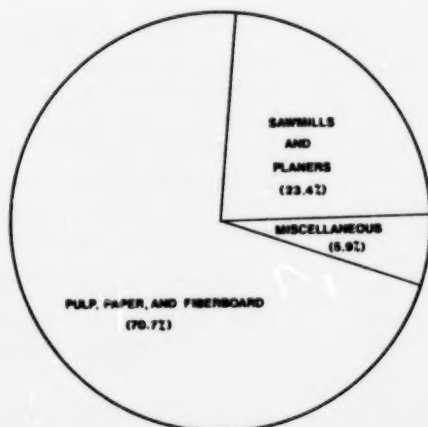
GOODS PRODUCING SECTOR



MANUFACTURING INDUSTRIES



FOREST PRODUCTS INDUSTRIES



THE PRIMARY WOOD-USING INDUSTRIES IN MANITOBA

Figure 14. Relative position of the forest industry in 1979 in terms of value added.
(Sources: Statistics Canada 1982a, b)

Table 62. Value added and value added per employee in the manufacturing sector by industry category, 1979^a

Industry Category	Total value added created		Average value added per employee	
	\$000	% of total manufacturing	\$	Rank
Food and beverage	337 272	20.3	31 521	8
Rubber and plastic products	20 822	1.3	28 720	9
Leather	13 807	0.8	26 501	10
Textiles	15 653	0.9	18 329	15
Knitting	8 277	0.5	17 573	16
Clothing	126 385	7.6	18 445	14
Primary wood-using ^b	65 088	3.9	44 221	4
Secondary and tertiary wood-using				
Primary metal	228 533	13.8	23 948	11
Metal fabricating	115 558	7.0	44 309	3
Machinery	167 328	10.1	32 906	6
Transportation equipment	157 151	9.5	34 737	5
Electrical products	150 922	9.1	23 006	12
Nonmetallic mineral products	73 325	4.4	32 373	7
Chemical and chemical products	74 762	4.5	46 036	2
Miscellaneous manufacturing	56 160	3.4	54 790	1
Petroleum and coal products	24 935	1.5	18 819	13
Residual	X	X	X	X
	X	X	X	X
Total manufacturing	1 660 707	100.0	29 413	

^a Source: Statistics Canada 1982a.^b Includes sawmills, planing mills, wood preservation, miscellaneous, and pulp, paper, and fiberboard mills.^c Includes furniture manufacturing, wooden boxes, kitchen cabinets, etc.

X Confidential.

Table 63. Value added and value added per employee by forest industry group, 1979

Industry group	Value added		Value added per employee \$/person-year
	\$000	% of total	
Sawmills	21 276	22.0	27 703
Independent planing mills	1 391	1.4	42 152
Miscellaneous ^a	5 715	5.9	26 216
Pulp, paper, and fiberboard	68 444	70.7	53 724
Total	96 826	100.0	42 227

^a Includes wood preservation.

and universal forest management policies, sustained yield and even flow. A number of authors, including Byron (1978), Smith (1974), and Keane (1972), have argued that stability and continuity of wood supply are necessary for minimizing the negative socioeconomic impacts resulting from community and employment instability. Thus, sustained yield and even flow have become cornerstones of forest management policy.

Byron (1978) describes these policies in the following terms:

Whereas the 'non-declining' aspect of sustained yield is meant to ensure permanence of forest industry centres, the type of community stability implicit in arguments for even-flow

regulation is short-term; stable production, employment and incomes each year will result from a uniform timber supply.

Hornberger (1974) suggests some general guidelines for ensuring community stability. He suggests that 25% of the total population should represent the labor supply and that "a single industry should not employ more than 5% of the labor supply initially and 10% ultimately for the financial protection of the community." Thus, if more than 2.5% of the total population of a particular community is employed in one industry, the financial security of the community is subject to the continued vitality of that industry. This report has adopted a higher estimate of 5% of the total population²³ employed in one industry as the guideline

²³ Participation rates in Manitoba are closer to 50% than 25% as Hornberger suggests. Thus the critical value for economic dependence is 5% (50% x 10%).

for determining economic dependence. Municipalities with 2.5-5.0% of their total populations employed in the forest industry are deemed to be heavily dependent on forest industry activities, and municipalities with 1.0-2.5% employed are considered marginally dependent.

Manitoba communities with some forest industry reliance are listed and ranked in Table 64. The communities are categorized as dependent, heavily dependent, and marginally dependent.

Eight Manitoba communities, representing a population of 12 176 people, were dependent on the forest industry in 1979-80. Seven communities with a total population of 4867 people were heavily dependent and an additional seven communities were marginally dependent. A number of other communities accounted for additional forest industry employment. These communities were not listed because either less than 1% of each of their populations was employed in the forest industry or because necessary population information was not available.

Table 64. Employment in the forest industry in some Manitoba communities, 1979

Employment center	Total Population ^a	Forest industry employment	% of population employed by forest industry
<u>Dependent communities</u>			
Sprague	85	77	91.0
Pine Falls	945	658	69.6
Blumenort	140	33	23.6
Elma	100	20	20.0
Durban	77	13	16.5
The Pas	6 390	990	15.5
Riverton	657	43	6.5
Swan River	3 782	234	6.2
Total	12 176		
<u>Heavily dependent communities</u>			
Cranberry Portage	984	46	4.7
Mafeking	276	13	4.7
Roblin	1 953	88	4.5
Pine River	398	16	4.0
Cowan	94	4	4.0
Winnipegosis	855	32	3.8
Richer	307	11	3.4
Total	4 867		
<u>Marginally dependent communities</u>			
Pelican Rapids	226	5	2.2
Woodridge	175	4	2.1
South Junction	48	1	2.1
Hodgson	111	2	1.8
Anola	133	2	1.5
Sandilands	87	1	1.2
Sundown	102	1	1.0
Total	882		

^a Source: Manitoba Bureau of Statistics 1982.

SUMMARY

The following summary provides highlights of the report.

Industrial Base

- In 1979-80, the primary wood-using industry of Manitoba consisted of 206 plants, including 1 thermomechanical newsprint mill, 1 kraft pulp mill, 1 building paper plant, 1 fiberboard plant, 2 wood preservation plants, 5 independent planing mills, 19 miscellaneous mills (producing building logs, pallets, posts, and poles), and 176 sawmills.

- The 176 sawmills varied in productive capacity from less than 5000 to 150 000 fbm per eight-hour shift.

- The five largest sawmills (3% of the total) accounted for 63% of Manitoba's final lumber production.

- The primary wood-using industry accounted for 3% of all jobs and 4% of wages and salaries paid in Manitoba's manufacturing sector in 1979.

- The total replacement value of the capital stock of Manitoba's primary wood-using industries was over \$600 million.

- The Mountain forest section accounted for the majority of operations (71), and was followed by Pineland (41) and Aspen Parkland (40). The majority of operations in each of these forests consisted of small sawmills producing less than 1 MM fbm of lumber per year.

Resource Base

- In Manitoba, 134 526 sq. mi. (64% of the total land area) are forest land. In 1979-80, the provincial govern-

ment owned and the Forestry Branch administered and managed 91 767 sq. mi., or 68% of the forest land. Productive and potentially productive forest land available for timber production (except parks) amounted to 52 268 sq. mi.

- Manitoba's productive forest lands supported a growing stock of 23 092 MM cu. ft., of which 7367 MM cu. ft. were hardwood stock and 15 725 MM cu. ft. were softwood. Black spruce accounted for 50% of softwoods and jack pine accounted for 36%.

- The total harvest from forest lands in 1980-81 was 82.5 MM cu. ft., 99% of which was extracted from provincial crown lands.

- The total softwood annual allowable cut was 204.2 MM cu. ft., of which roughly 27% was harvested by the industry.

- The hardwood annual allowable cut was 72.9 MM cu. ft., of which only 7% was harvested.

- The Hayes River forest section was the largest softwood volume (3248 MM cu. ft.), followed by the Highrock forest section (2802 MM cu. ft.).

- The forest section with the greatest volume of hardwoods was Mountain (2099 MM cu. ft.) followed by Lake Winnipeg East (1125 MM cu. ft.).

Products

- The primary wood-using industry produced 153 MM fbm of lumber, 371 000 tons of kraft pulp, newsprint, and building paper, 1.1 MM cu. ft. of treated products, and varying amounts of other assorted products.

- Dimension material was the major lumber product, representing 81% of total final production. About 67% of all lumber produced was planed.

- The species mix in lumber production consisted of 44% pine, 35% spruce, 18% deciduous, and 3% other coniferous species.

- The Saskatchewan River forest section produced more lumber than any other forest section (43% of all lumber produced), followed by the Mountain forest section (24%).

- All kraft pulp was produced in the Saskatchewan River forest section by Manitoba Forestry Resources Ltd., and all newsprint was produced in the Pineland forest section by Abitibi-Price Inc.

Economic And Social Impacts

- Gross sales of all products manufactured by the forest industry amounted to over \$197 million.

- Forest products exported to out-of-province markets brought an estimated \$117 million in external income into the province.

- Total direct employment by the forest industry was 1080 person-years in logging and 1799 person-years in manufacturing. An additional 3718 jobs were supported indirectly by the industry.

- Employees of native ancestry made up about 22% of the forest industry labor force.

- The total direct payroll of the forest industry was \$48 million and the average annual income per person was \$24 529 in the pulp, paper, and fiberboard industry group, \$18 181 in the sawmill industry group, \$11 333 in the planing mill industry group, and \$10 283 in the miscellaneous industry group.

- In addition to the total direct payroll, an additional \$10 million was estimated to have been paid to contractors' employees.

- Value added by Manitoba's primary forest manufacturing industry groups was \$97 million. These industries accounted for 4% of the total value added for the manufacturing sector.

- Value added per employee was \$53 724 in the pulp, paper, and fiberboard group, \$42 152 in the independent planing mill industry group, \$27 703 in the sawmill industry group and \$26 216 in the miscellaneous industry group. Value added per employee in Manitoba's manufacturing sector averaged \$29 413.

- Eight Manitoba communities, with a total population of 12 176 people, were economically reliant on the forest industry.

ACKNOWLEDGMENTS

The authors wish to thank the owners and management personnel of all forest industry groups for their cooperation in providing confidential information on their operations. In addition, thanks are due to all members of the steering committee directing this study. Special thanks are also extended to L. Gravelines of the Department of Natural Resources of Manitoba. The many constructive comments of other

members of the review board, including Drs. J. Gray and B. Moody, are also acknowledged. Appreciation is extended to V. Good for editorial assistance. Finally, the assistance of members of the Northern Forest Research Centre, particularly J. P. De Franceschi, D. Kuhnke, R. A. Bohning, and H. M. Stewart, for data collection, compilation, table preparation, and verification is most gratefully acknowledged.

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APPENDIX I

STANDARD INDUSTRIAL CLASSIFICATION
LISTINGS FOR FOREST INDUSTRIES, 1980^a

	Standard Industrial Classification Code
<u>DIVISION C - LOGGING AND FORESTRY</u>	
<u>Major Group 4 - Logging</u>	041
Logging	0411
<u>Major Group 5 - Forestry services</u>	051
Forestry services	
<u>DIVISION E - MANUFACTURING INDUSTRIES</u>	
<u>Major Group 25 - Wood industries</u>	
Sawmills, planing mills, and shingle mills	251
a) Shingle and shake industry	2511
b) Sawmills and planing mills	2512
Veneer and plywood mills	252
Sash, door, and other millwork plants	254
Wooden box and pallet industry	256
a) Wooden box and pallet industry	2561
Miscellaneous wood industries	259
a) Wood preservation industry	2591
b) Particle board industry	2592
c) Waferboard	2593
d) Other wood industries	2599
<u>Major Group 27 - Paper and allied products industries</u>	
Pulp and paper mills	271
Asphalt roofing manufacturers	272
Paper box and bag industries	273
Other converted paper products industries	279

^a Source: Statistics Canada 1980. Standard industrial classification manual. Cat. No. 12-501E. Ottawa, Ontario

APPENDIX 2

SELECTED METRIC (SI) UNITS AND CONVERSION FACTORS^a

Imperial	Metric (SI)
1 inch	= 2.54 cm
1 mile	= 1.609 km
1 acre	= 0.405 ha
1 square mile	= 2.590 km ²
1 cord (85 cubic feet (cu. ft.) solid wood)	= 2.407 m ³
1 cu. ft.	= 0.028 m ³
1 cunit (100 cu. ft. solid wood)	= 2.832 m ³ (roundwood)
1 ton (2000 lb.)	= 0.907 t
1 cord (stacked) per acre	= 8.956 m ³ (stacked) per ha
1000 board feet	= 4.29 m ³ (roundwood)
1 M foot board measure (fbm)	= 1.623 m ³ (lumber)
1 bone dry unit (BDU) wood chips (2400 lb.)	= 1090 kg
1 bale of shavings (30 lb.)	= 14 kg
1 sq. ft. of sheet product (1/2-in. basis)	= 1.180 m ² (1-mm basis)
1 sq. ft. of sheet product (1/16-in. basis)	= 0.147 m ² (1-mm basis)
M = thousand	
MM = million	

^a Source: Environment Canada 1974. Selected metric (SI) units and conversion factors for Canadian forestry. Environ. Can. Ottawa, Ontario. Unnumbered.

Conversion Factors for Timber Products

These factors are approximate values and may vary depending upon tree size, manufacturing practice, species, etc.

<u>Timber product</u>	<u>Equivalent value</u>
1 cunit (100 cu. ft.)	= 660 fbm (roundwood)
Grade #1 railway ties (7" X 9" X 8')	= 42 fbm
Grades #2, #3 railway ties (6" X 8" X 8')	= 32 fbm
1 bundle (50 pieces) of lath	= 9 fbm
Fence posts (per piece):	
6' X 3 1/2" top diameter	= 0.4 cu. ft.
6' X 4 1/2" top diameter	= 0.7 cu. ft.
6' X 5 1/2" top diameter	= 1.0 cu. ft.
7' X 3 1/2" top diameter	= 0.5 cu. ft.
7' X 4 1/2" top diameter	= 0.8 cu. ft.
7' X 5 1/2" top diameter	= 1.2 cu. ft.
8' X 5 1/2" top diameter	= 1.3 cu. ft.
8' X 6 1/2" top diameter	= 1.8 cu. ft.
8' X 7 1/2" top diameter	= 2.4 cu. ft.
8' X 8 1/2" top diameter	= 3.2 cu. ft.
Power and telephone poles	= 9-30 cu. ft. (depending on size)

APPENDIX 3**SEASONALITY OF EMPLOYMENT, BY
FOREST INDUSTRY GROUPS, 1979**

Figure A. Seasonality of employment in sawmills 5 MM fbm and over annual production.

Figure B. Seasonality of employment in sawmills 1 MM to 5 MM fbm annual production.

Figure C. Seasonality of employment in sawmills 100 M to 1 MM fbm annual production.

Figure D. Seasonality of employment in sawmills less than 100 M fbm annual production.

Figure E. Seasonality of employment in independent planing mills.

Figure F. Seasonality of employment in the wood preservation industry.

Figure G. Seasonality of employment in the pulp, paper, and fiberboard industry group.

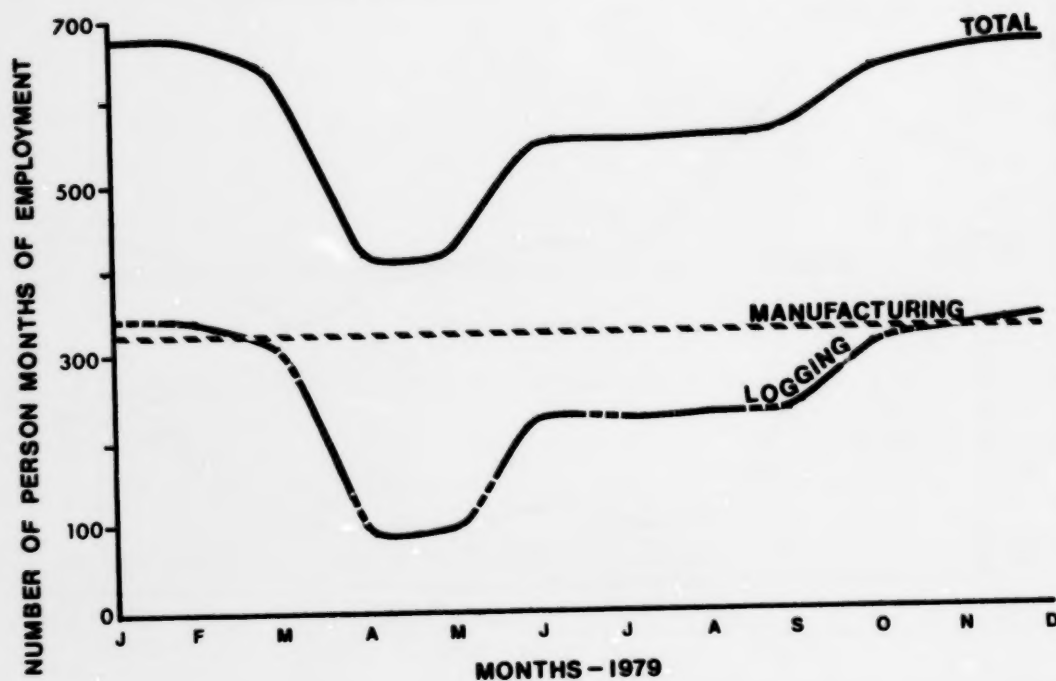


Figure A. Seasonality of employment in sawmills 5 MM fbm and over annual production.

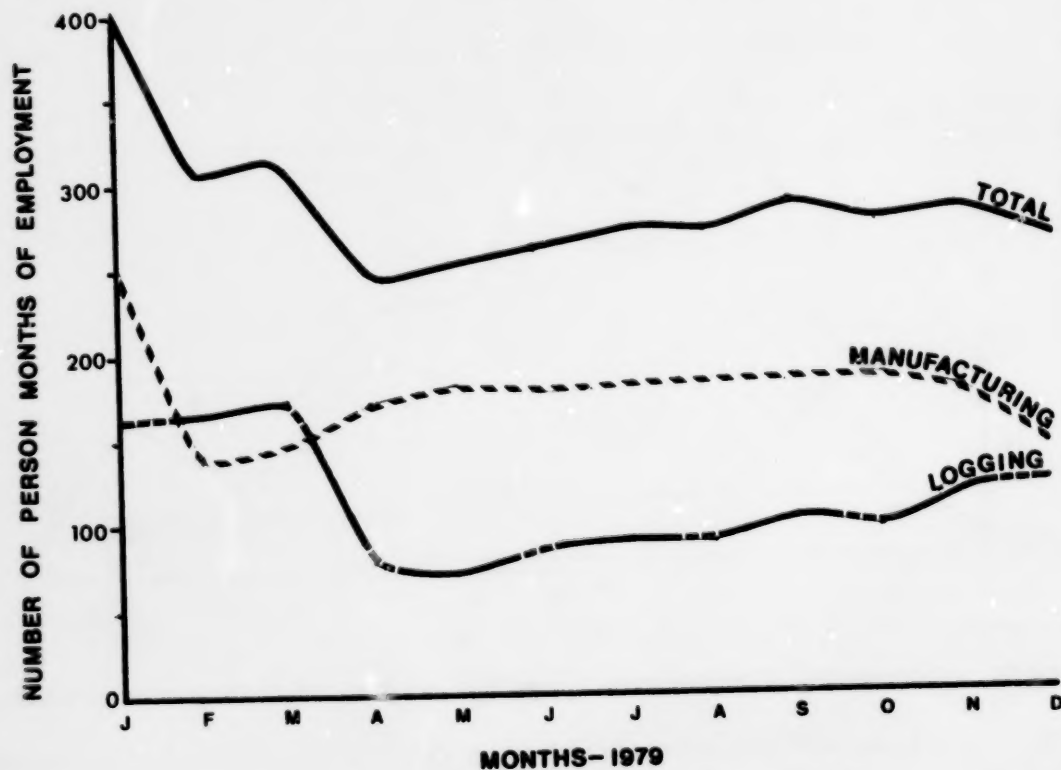


Figure B. Seasonality of employment in sawmills 1 MM to 5 MM fbm annual production.

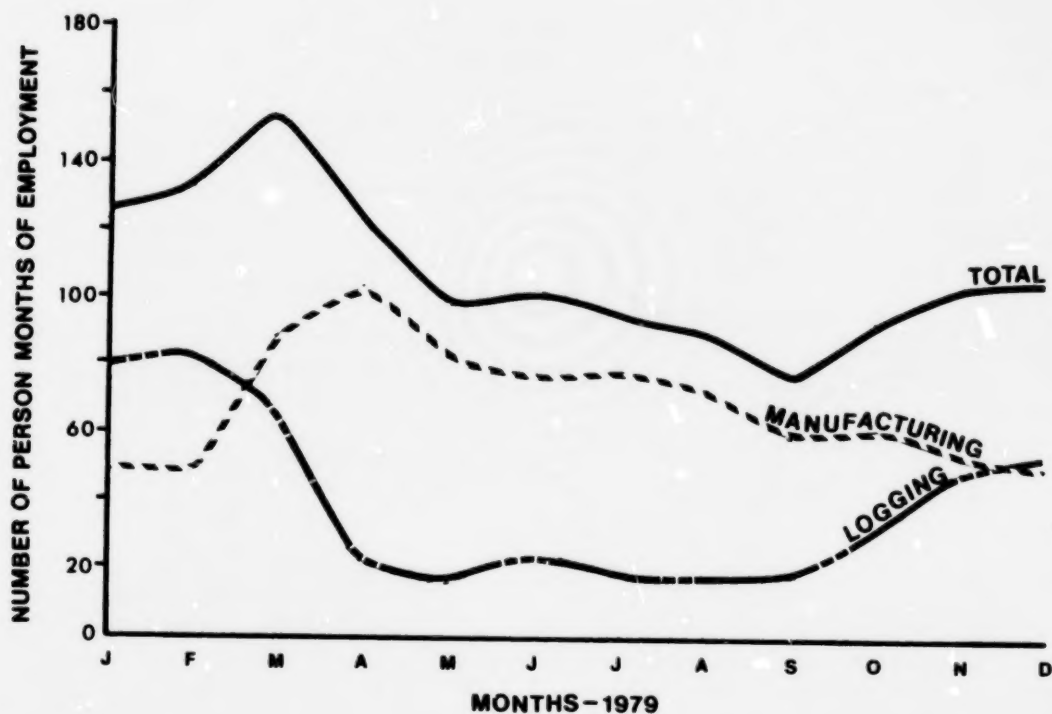


Figure C. Seasonality of employment in sawmills 100 M to 1 MM fbm annual production.

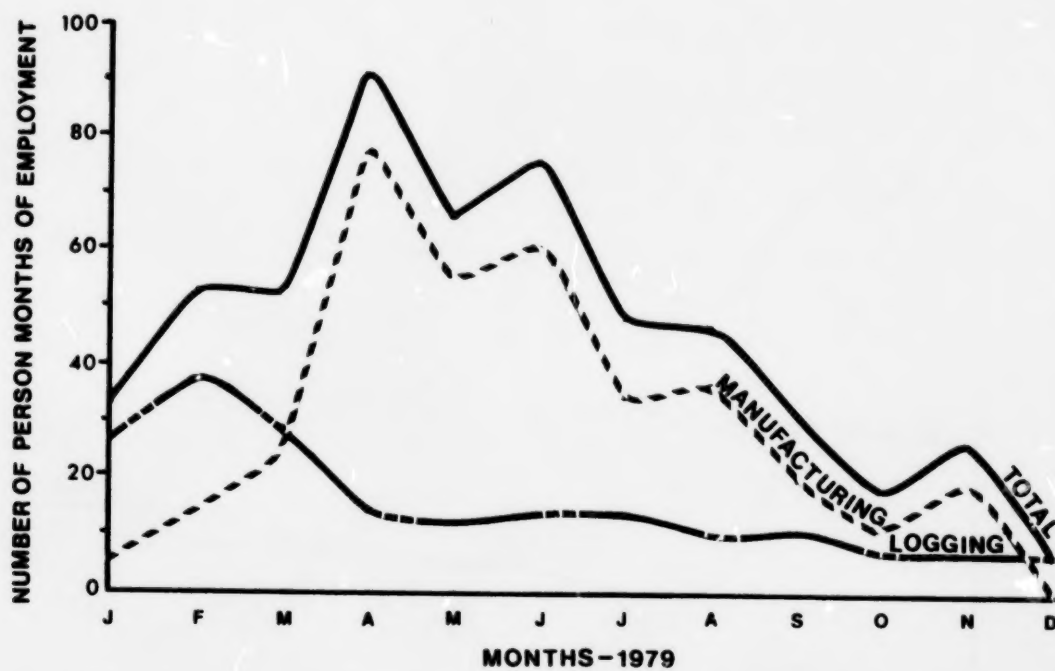


Figure D. Seasonality of employment in sawmills less than 100 M fbm annual production.

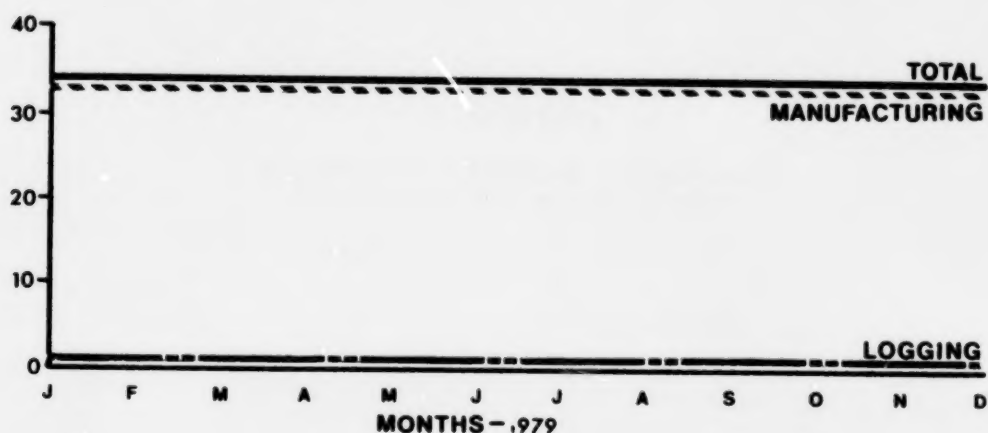


Figure E. Seasonality of employment in independent planing mills.

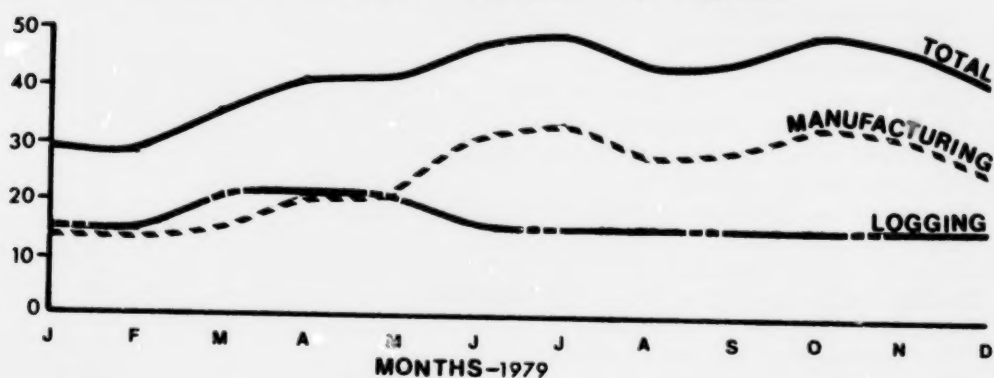


Figure F. Seasonality of employment in the wood preservation industry.

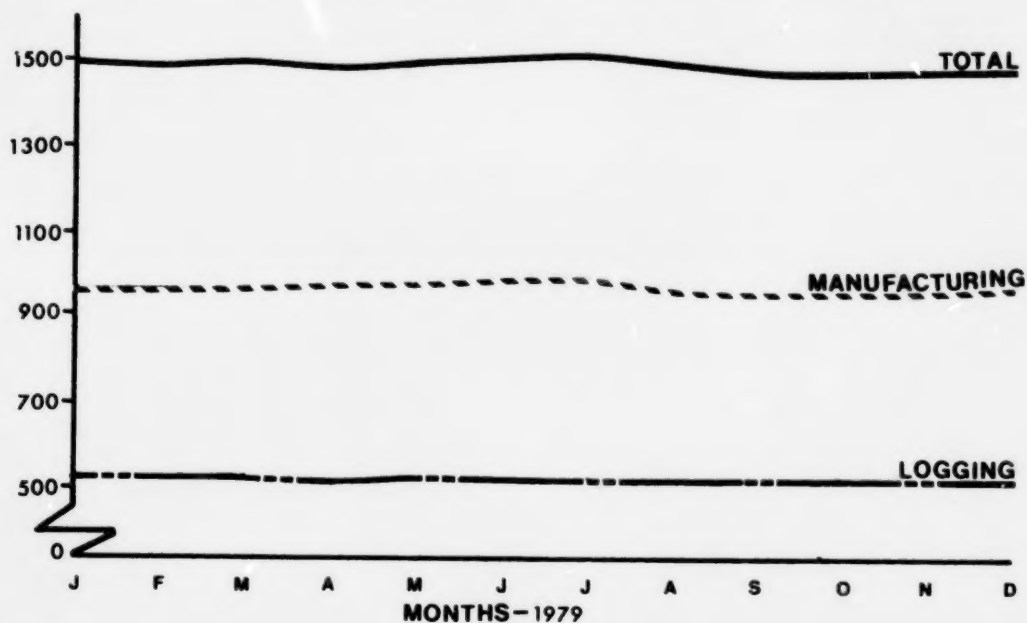


Figure G. Seasonality of employment in the pulp, paper, and fiberboard industry group.

APPENDIX 4

COMPONENT INDUSTRY GROUPS OF
FOREST PRODUCTS CATEGORY^a

<u>Industry group</u>	<u>Standard Industrial Classification Code</u>
1. Sawmills and planing mills	2513
2. Veneer and plywood mills	2520
3. Sash, door and other millwork, N.E.S.	2541
4. Prefabricated buildings (wood frame)	2543
5. Manufacturers of wooden kitchen cabinets	2544
6. Wooden box factories	2560
7. Coffin and casket industry	2580
8. Wood preservation industry	2591
9. Miscellaneous wood industries, N.E.S.	2599
10. Furniture re-upholstery and repair	2611
11. Household furniture manufacturers, N.E.S.	2519
12. Office furniture manufacturers	2640
13. Miscellaneous furniture and fixture manufacturers	2660
14. Pulp and paper mills	2710
15. Asphalt roofing manufacturers	2720
16. Folding carton and set-up box manufacturers	2731
17. Corrugated box manufacturers	2732
18. Paper and plastic bag manufacturers	2733
19. Miscellaneous paper converters	2740
20. Commercial printing	2860
21. Plate making, typesetting, etc., industry	2870
22. Publishing only	2880
23. Publishing and printing	2890

^a Source: Alberta Bureau of Statistics 1981. Alberta principal manufacturing statistics - 1978. Alberta Treasury, Edmonton, Alberta.